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Original Communications

CONTROVERSIAL FACTORS IN THE MANAGEMENT OF FUNDAL CARCINOMA*

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THERE has been a relatively slow but gradual evolution in the management of fundal carcinoma throughout recent years. While surgery has, and continues to play the major role in treatment, the question at issue today is to what extent irradiation therapy can be relied upon as a valuable adjunct. This is in contradistinction to the thoughts of most of us with regard to the prime importance of irradiation treatment in cervical carcinoma. It is only by careful scrutiny of one's own work and methods, and pooling the same with the experiences of others, that we may perhaps arrive at an honest, if not an indisputable, answer to this query.

It may be stated at the outset that we are strong advocates of the advantages of irradiation therapy in conjunction with surgery as a planned procedure in treating fundal carcinoma. It would seem better, however, first to trace the steps that have led us to this conclusion before presenting the evidence that is so much in agreement with the work of other observers, and finally to outline our present procedure and results.

Our first report relating to the experience of myself and my associates was published in 1937. In 1940 the senior author had the privilege of discussing Norman Miller's complete and convincing paper on the same subject, at which time we both agreed that irradiation prior to surgery was the procedure of choice, although we differed in the technique, Miller preferring x-ray and we, radium. Our second report, published in 1943, represented a continuation of our efforts along the same line. A study of 127 patients, observed on the Gynecologic Ward

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and Private Services at the Jefferson Medical College Hospital between Sept. 1, 1921, and Sept. 1, 1942, formed the basis of that report. Of these patients, 75 were eligible for the consideration of a five-year survival rate, based on various methods of treatment, and irrespective of the stage of the disease encountered.

The former reviews dealt rather exhaustively with basic findings relative to age incidence, parity, menopausal relationships, duration of symptoms, diagnosis, and associated pathology—findings largely in accord with those of other observers. Most of the data presented in our more recent report substantiated those previously presented, and a further summary along these lines of investigation would be an unnecessary repetition. Of greater interest, we believe, is a summary of our present end-results, in comparison with changing concepts of management and treatment, especially in the light of the controversial factors that do exist.

Both of the earlier communications terminated with an over-all picture of the end-results of therapy; first, irrespective of the type of treatment; second, with regard to surgery, irradiation, and surgery combined with irradiation, respectively. In addition, patients have been included whose primary treatment was initiated elsewhere. Expressed in percentages, the various results presented were certainly mediocre. Based as they were on the earliest types of management, the final statistics offered did not truly represent the slow, but certain, improvement that was noted clinically as time went on, seemingly because of a more thoroughly planned technique. The time necessary to prove the value of newer concepts of management seems to pass too slowly in terms of improved survival figures, and too rapidly in terms of energy and physical effort expended. One's span of life is pathetically short when there is so much to be learned, so much to be accomplished. Some of our colleagues have criticized us for not being more selective in the presentation of results achieved; why go back, they say, to the dark ages, as it were, in computing present-day results? Perhaps they are right, but our answer has been that sufficient time must elapse before one can be sure that the path so painstakingly followed is really the right one, even though the trends observed have apparently pointed in that direction.

Influenced by these thoughts, we have decided in this presentation not to stress entirely the over-all end-results observed throughout these twenty-four years, but to select for your consideration a more rational approach to the solution of the cure or arrest of fundal carcinoma by selective discussion of the trial and error methods that have finally led to a more or less standardized plan of treatment. In this way we can perhaps interpret our end-results to much better advantage.

Since Sept. 1, 1942, and up to Sept. 1, 1945, 32 additional patients have been observed. The present survey thus provides a consecutive series of 159

TABLE I. PATIENTS OBSERVED AND FOLLOW-UP

YEARS	SEEN	TREATED	FOLLOW-UP PER CENT
1921-42	127	126	100
1942-45	32	31	100
Total	159	157	100
104 Patients eligible for five-year survival statistics			

patients, of whom 104 are eligible for a five-year survival study based upon various plans of treatment. No patients are untraced (Table I).

The Role of Surgery Without Irradiation

Surgery alone, without any form of irradiation, has played a negligible role in the treatment of fundal carcinoma at Jefferson Hospital. Prior to 1928, a few patients were subjected to panhysterectomy with adnexal removal, but since then this has been only an occasional procedure, and for very definite reasons in each case. In previous reports we gauged the end-results obtained with surgery, without regard to its adequacy in all cases. That this was misleading is shown in this report where we have definitely divided the patients treated surgically into the proper categories as noted in the accompanying tables.

TABLE II. FIVE-YEAR RESULTS WITH ADEQUATE SURGERY ALONE

YEARS	PATIENTS	SURVIVORS	PER CENT
1921 to 1940	8	5	62.5
One primary mortality (12 days postoperatively)			12.5
1940 to 1945	5	5	(2 to 4 years)
No primary mortality			
Total primary mortality			7.6

Table II shows a five-year survival rate of 62.5 per cent—eight to twenty years after operation. The postoperative death occurred in a diabetic patient with cardiovascular disease twelve days after operation. All but one of these five patients were operated upon prior to 1930, and primarily because the diagnosis was definitely established or strongly suspected. The remaining patient had a huge myoma, and although endometrial cancer was a definite possibility, diagnostic curettage demonstrated that the uterine cavity was unsuitable for a preliminary radium application, and radical operation was proceeded with at once, six years ago.

Three of the five patients operated upon within the past five years had been treated with radium for benign conditions four to eleven years previously, and are part of a group of patients reported upon several years ago at a meeting of the American Gynecological Society. In a sense, one could say that irradiation might have been responsible to some extent for their present-day survival, but such a conclusion is purely presumptive. The remaining two patients were operated upon for myoma and ovarian cyst, respectively, and radical operations were performed routinely in the first case and because of a frozen section diagnosis of ovarian carcinoma in the second case (metastatic from uterus).

We do not know why follow-up x-ray was not used in the case of the two patients adequately operated upon in 1923, but who lived less than a year thereafter. We do know, however, that x-ray was not employed as a follow-up measure in the 10 patients surviving from two to twenty years, because it was believed that the surgery was sufficiently complete and because there was no visual or palpable evidence of pelvic or abdominal extension beyond the removed uterus and adnexa. We will comment again with reference to our failure to use routine postoperative x-ray when the surgery seems to be complete and adequate.

Table III groups the patients having inadequate procedures, only one of whom survived longer than a year. In 1926, a positive diagnosis was made in one patient by curettage when a polyp was removed; a radical operation was planned, but not consummated because a fairly large adherent ovarian cyst interfered technically. The remaining cervical stump was cauterized from above.

TABLE III. FIVE-YEAR RESULTS WITH INADEQUATE SURGERY ALONE

YEARS	PATIENTS	SURVIVORS	PER CENT
1921 to 1940	4	0	0.0
One primary mortality			25.0
1940 to 1945	1	0	0.0
Total primary mortality (Uterus not removed in two cases)			20.0

Recurrent carcinomatosis caused death within five years. Vaginal hysterectomy without adnexal removal was followed by recurrence in less than a year in a second case. A third patient, aged 47 years, operated upon for myoma by the supravaginal technique without preliminary curettage, was found to have adenocarcinoma when the removed fundus was inspected. The cervical stump was cauterized and both adnexa removed, but peritonitis claimed the patient on the seventh postoperative day. In the case of the remaining two patients, exploratory incisions revealed generalized abdominal carcinomatosis.

The first three patients mentioned above were all operated upon fifteen years ago or longer, and in retrospect represent errors in judgment, modified in one instance by technical difficulty. Follow-up x-ray was suggested in the latter case, however, but refused.

We are ashamed of the primary mortality rate recorded in these two tables, even though one of the deaths may be excused on the basis of the patient's substandard physical condition. Present-day intravenous methods and chemotherapy might have saved the other, for whose death we believe our error in judgment was responsible.

Radium Therapy Alone

During nearly every year covered by this report, one or more patients have been treated solely with intracavitary applications of radium. In a very few instances, there have been repetitions of such applications. With few exceptions, the patients were elderly, either approaching or within the sixth decade of life, and some of them were obviously very poor risks as well. Furthermore, as previously mentioned, subsequent surgery was not clearly visualized as a planned procedure prior to 1928, or thereabouts. Consequently, dependence was usually placed upon the radium therapy alone. Where advanced involvement was suspected, or where subsequent surgery was contraindicated, external irradiation with x-ray complemented the radium treatment. Since 1928, however, we have had to contend with the refusal of some patients to submit to postirradiation surgery. While satisfactory results to date have been experienced in numerous instances, we wonder, in looking backward, whether more patients in our irradiation series might not be alive today had subsequent surgery been carried out. Some individual recurrences, at a date relatively remote from the initial radium treatment, convince us that an opportunity for permanent arrest of the disease has probably been missed in certain instances. Nevertheless, it cannot be denied that patients with diabetes and cardiovascular disease, especially in the upper age brackets, may have lived longer and with less risk than if surgery had been undertaken following the irradiation.

We also believe that it has been the experience of many of us, that a goodly number of patients with fundal carcinoma are so obese as to discourage surgery. Half a dozen such instances stand out in our memory; women in the neighborhood of 250 pounds or more, whom we have lacked the courage, but not the judgment, to operate upon, relying on irradiation for no other reason, and in spite of the fact that they were not in too old an age group. In such circum-

stances we believe that it is advisable to repeat curettage and radium at selected intervals, even in the absence of recurrent bleeding. This procedure seems to have justified itself in the present-day survival rate noted in certain of these individuals.

It has been interesting to break down the irradiation group for specific analysis, for it is evident that there will always be certain patients in whom irradiation therapy will have to be relied upon for the reasons mentioned. It is commendable to be an idealist, but one cannot always practice idealism, at least in surgery.

TABLE IV. FIVE-YEAR RESULTS WITH RADIUM ALONE

YEARS	PATIENTS	SURVIVORS	PER CENT
1921 to 1940	24	11	45.8
(2 additional patients, surviving six and seven years, still have cancer; another survived six years, but died of cancer)			
1940 to 1945	7	6	(2 to 4 years)
No primary mortality			

Table IV shows that 31 patients have been treated solely with radium, 80 per cent of whom have ranged in age from 55 to 77 years. Of 24 eligible for five-year statistics, 11 have survived from five to seventeen years—45.8 per cent. The remainder of the table is self-explanatory.

Four patients refused subsequent surgery. One is bed-fast; three are alive from two to seventeen years. Two received radium for benign conditions six and twelve years before receiving treatment for definite endometrial cancer. In the latter case, a review of the original slide showed a diagnostic error. It is astonishing that this patient's malignancy was impotent for so long a time; on the basis of this, and because of her advanced age, it was decided to employ only a large dosage of radium, which she has now survived seven years without signs of recurrence. Two excessively fat women, with low-grade malignancies, have been treated with radium alone (repeated in one instance) and are free of symptoms for two to four years, respectively. Relatively early deaths in 11 patients following radium treatment alone, apparently indicate that more advanced disease was present than was estimated when radium alone was chosen for these individuals. Chiefly over 60 years of age, none of them survived longer than three years.

There was no immediate mortality in this group. The radium dosage during the past decade has averaged 4,500 to 5,000 mg. hr. (screening with 1.5 mm. of platinum). Previously, the dosage varied from 2,400 to 3,600 mg. hr. (0.3 mm. silver and 1.0 mm. brass, or 0.5 mm. platinum-screening prior to 1937). Fewer complications were noted than in cervical carcinoma with radium therapy.

Radium Therapy With X-ray in Addition

Whenever it is thought that endometrial cancer is deeply invasive or has passed beyond the confines of the uterus, deep x-ray therapy is used to supplement the radium. This is as true of the past as it is of the present. X-ray has been used more frequently after the radium application. Whereas the radium applications were rarely repeated in those patients who were treated with it alone, it has not been uncommon for patients receiving x-ray in addition to have had several intracavitary applications, especially with recurrence of symptoms. This is understandable, for those patients receiving both types of irradiation therapy were more likely to represent advanced cases, or cases too advanced to depend upon radium alone. Here again, the majority of the patients—75

TABLE V. FIVE-YEAR RESULTS WITH X-RAY ALONE

YEARS	PATIENTS	SURVIVORS	PER CENT
1921 to 1940	1	0	0.0
1940 to 1945	1	0	0.0
Primary treatment elsewhere in one case)			

TABLE VI. FIVE-YEAR RESULTS WITH RADIUM AND X-RAY

YEARS	PATIENTS	SURVIVORS	PER CENT
1921 to 1940	30	11	36.6
(4 additional patients survived 6 to 8 years, but died of cancer)			
1940 to 1945	7	3	(1 to 2 years)
No primary mortality (Primary treatment elsewhere in one case)			

per cent—were between 55 and 75 years of age, and regarded as doubtful surgical risks from several angles.

Table V shows that only two patients were treated with x-ray therapy alone —exceedingly advanced cases.

Table VI shows that 37 patients have been so treated, of whom 30 are eligible for five-year statistics—the survival rate being 36.6 per cent, definitely lower than in the similar numerical group receiving radium alone. This might be expected because the lesions observed were relatively farther advanced.

Three patients in this group are deserving of special mention. Two of them, aged 37 and 40 years respectively when treated primarily ten to thirteen years ago, exhibited high-grade malignancy in the curettage, and both refused subsequent surgery. Repeated curettage at intervals since has been negative. This is also true of the third patient, aged 40 years and excessively obese, but exhibiting a low-grade lesion primarily. We hesitated to operate upon this patient.

The factors employed in our x-ray therapy are 25 Ma. at 200 kv., filtered through 0.5 mm. or 1.0 mm. of copper and 1.0 mm. of aluminum at 50 cm. S.T.D.; ports 16, 19, or 20 cm. square. Two anteriorly and two posteriorly are employed at first, cross-firing the uterus and parametrium. Two such areas are treated daily, each receiving 200 r. (measured in air). The treatments are continued until a well-marked erythema is obtained, which in general will occur with a total of 1,600 to 2,400 r. to each portal. Three to four weeks are required to complete the cycle, but if the time is not restricted, and to avoid sickness, the daily r. treatment is reduced, and the treatments extended over a longer period of time.

Experiences With Surgery and Irradiation Combined

Irradiation therapy in some form as an adjunct to surgery furnishes an interesting analysis with regard to results. In previous reports, patients were included indiscriminately in this grouping, even when the surgery was limited to an exploratory laparotomy. Such an inclusion may be quite correct in computing an absolute survival rate, but it is of no value in estimating the worth of a particular type of treatment. It seems much fairer to consider separately the character of the surgical procedure together with the circumstances that determined it, and the manner in which the associated irradiation was utilized. Accordingly, we have chosen to break down the entire group of 69 patients so treated into three categories: first, those in whom the surgery was inadequate or incomplete and accompanied with some form of irradiation in addition; second, those in whom the surgery was adequate and essentially complete, with irradia-

tion in addition, but not employed according to any set plan; third, that group of patients in whom adequate surgery followed preliminary intrauterine radium applications according to a definitely conceived technique.

I. *Inadequate surgery with some form of irradiation in addition.*—By inadequate surgery we mean anything short of complete hysterectomy with adnexal removal. Table VII, showing only a 23 per cent five-year survival rate, requires some explanatory remarks.

TABLE VII. FIVE-YEAR RESULTS WITH INADEQUATE SURGERY PLUS RADIUM AND/OR X-RAY

YEARS	PATIENTS	SURVIVORS	PER CENT
1921 to 1940	13	3	23.0
(3 additional patients survived 5 to 7 years, but died of cancer)			
1940 to 1945	4	3	(2 to 3 years)
No primary mortality (Primary treatment elsewhere in 3 cases) (Uterus not removed in 6 cases)			

Taking all the patients in the table into consideration, we find that supravaginal hysterectomy with adnexal removal was carried out in five patients under our direction. In two of them, endometrial cancer has been diagnosed by preliminary curettage. This was in 1930, before we were applying radium first, and radical operation was immediately planned. This could not be carried out completely because of technical difficulties, but both cervical stumps were cauterized from above and thought to be free of cancer, as shown by histologic study of the removed uteri. Follow-up x-ray was administered, and the patients have survived 11 and 16 years, respectively, without recurrence. In the remaining three patients, cancer was not suspected, and no preliminary curettage was done. Radium was applied to the left broad ligament, followed by x-ray therapy in one instance, and to the cervical stump in another—both patients eventually dying of cancer, although one survived seven years. Both were operated upon twelve to fifteen years ago. The third patient in this group, operated upon two years ago without preliminary curettage, and as a myoma case, had received some x-ray therapy elsewhere before coming to us. She has had postoperative x-ray, and remains well and symptom-free at present. However, the treatment of this patient and the other two represents definite errors of judgment in our primary management of these patients, but with a relatively fortunate outcome.

Supravaginal hyserectomy with adnexal removal was carried out elsewhere in three patients, the operations having been performed for myoma without preliminary curettage or any suspicion of endometrial cancer, the latter being discovered in the removed uteri. Postoperative x-ray has been supervised by us, the patients now surviving three to five years; all errors of judgment primarily but with good result to date, possibly because the amputation was sufficiently low.

Two patients had vaginal hysterectomy without adnexal removal. In one, the operation was for procidentia, the cancer being found by the pathologist in the removed uterus. Postoperative x-ray was effective for a few years only. The other patient, primarily treated twice with intrauterine radium as a bad surgical risk, was persuaded to have a vaginal hysterectomy elsewhere, but without adnexal removal. She survived the operation but died within five years of carcinomatosis. Errors in judgment can be charged in both cases—failure to perform diagnostic curettage in the first instance, accounting for incomplete surgery, and unwise and inadequate surgery in the second case.

One patient with preliminary radium had subsequent panhysterectomy, but one adnexa was allowed to remain—why, we do not know—and follow-up

x-ray was ineffectual, death occurring three years later. Incomplete surgery may have been at fault.

In four instances, exploratory operation was all that could be accomplished because of inoperability, and postoperative x-ray was used in all instances, as well as radium in one case. Only one patient survived as long as five years; all died of cancer. These cases were relatively hopeless from the start.

In one patient, radium to the uterus for endometrial cancer was accompanied with laparotomy for metastatic ovarian carcinoma and resection of an independent cancer of the sigmoid. Follow-up x-ray was used, the patient surviving for two and one-half years—practically a hopeless picture from the beginning.

Another patient was given radium to the uterine cavity and x-ray postoperatively, following the removal of bilateral ovarian carcinomas with implants (metastatic), death occurring within two years; a difficult and inoperable case when seen primarily.

In the group of 13 patients eligible for five-year survival statistics, it will thus be seen that the three patients surviving more than five years had their uteri removed supravaginally, there was no evidence of cancer in the retained stump, and postoperative x-ray was employed in addition. Of the remaining 10 patients, hysterectomy was part of an incomplete operation in five instances, the accompanying irradiation was ineffectual, and to all of them, errors of judgment might be charged. In five other cases, the uterus could not be removed because of inoperability when first seen, instances of delayed diagnosis.

Of the four patients treated within the past five years, three are surviving the supravaginal operation with postoperative x-ray, and doing well because the cervix and adnexae were apparently uninvolved. A patient with metastatic cancer in both ovaries was obviously inoperable when first seen.

The importance of preliminary curettage and the necessity of always thinking of endometrial cancer as an accompanying lesion in the presence of myoma in the menopausal and postmenopausal age groups when planning immediate surgery is well demonstrated in the analysis of the patients in this group. The low survival figure is indicative of such errors.

TABLE VIII. FIVE-YEAR RESULTS WITH ADEQUATE SURGERY PLUS RADIUM AND/OR X-RAY (UNPLANNED TECHNIQUE)

YEARS	PATIENTS	SURVIVORS	PER CENT
1921 to 1940	16	6	37.5
(One additional patient survived 7 years, but died of cancer)			
1940 to 1945	5	4	(1 to 4 years)
No primary mortality (Primary treatment elsewhere in one case)			

II. *Adequate surgery with some form of irradiation in addition (unplanned technique).*—Table VIII shows a five-year survival of 37.5 per cent. There were 16 patients in this group, all of whom had complete hysterectomy with bilateral adnexal removal. Of these, six were operated upon prior to 1930, when the only form of irradiation that we were using in addition to adequate surgery was postoperative x-ray. Only one has survived—for 19 years; four died within one year; one survived three years.

Another group of seven were operated upon after that period, and of these three have survived from five to ten years, one lived for seven years but died of cancer, and three died within a year of operation. All received preliminary radium and x-ray, although one received x-ray elsewhere for a myoma before we correctly diagnosed endometrial cancer. One survivor, and one who died within a year, also received postoperative x-ray.

Three remaining patients in this group are worthy of comment. One had received radium elsewhere sometime before our operative treatment of her. This was in 1927, and we were unable to obtain correct information regarding her former treatment. She died of spinal metastases within a year of our operation. The second patient, operated upon in 1928, had an interposition operation together with radium for metropathia hemorrhagica. Routine curettage revealed endometrial cancer, and complete surgery was performed a few months later. The patient survived eight years, developed insanity, and committed suicide. The third patient was treated with radium in 1936 at the age of 61 years, with apparent arrest of symptoms; seven years later she was readmitted because of pyometra, and complete operation was performed at the age of 68 years. Extensive carcinoma was present in the uterus. She has remained well and symptom-free for two years, now aged 70 years, and nine years since her initial treatment.

It was this transition period in our work that convinced us of the efficacy of preoperative irradiation. We were impressed with the destructive action of the radium upon the endometrial carcinoma, as noted in the removed uteri, even though attenuated or viable cells were reported present; also, the absence of recurrence in the vaginal vault. We began to note a longer survival period from the work of this 1930 to 1940 decade. What seemed to discourage us about the postoperative x-ray was its apparent ineffectiveness, while its use in a few instances before surgery seemed to cause considerable skin change that necessitated postponement of subsequent surgery. We determined to rely upon preoperative radium only, whenever possible, and to build up such a series of cases.

Of the five patients noted in Table VIII as having been treated within the past five years, one came to us for vaginal recurrence following complete surgery elsewhere. The irradiation received there was postoperative x-ray which we continued, but death ensued a few months later. Two more patients had complete surgery in our hands because of operation for myoma, with unsuspected endometrial cancer in one case, and metastatic ovarian carcinoma in another; postoperative x-ray was employed as a routine, since there had been no preliminary irradiation. A fourth patient received preoperative x-ray because the initial curettage perforated the uterine cavity and radium was not employed. Complete operation followed in three months. The fifth patient had x-ray elsewhere for "menopausal bleeding" before we made the diagnosis of cancer, administered radium, and then performed complete surgery. They have survived for one, two, and four years, respectively.

TABLE IX. FIVE-YEAR RESULTS WITH PRELIMINARY RADIUM PLUS ADEQUATE SURGERY (PLANNED TECHNIQUE)

YEARS	PATIENTS	SURVIVORS	PER CENT
1921 to 1940	10	9	90.0
1940 to 1945	21	20	(1 to 4 years)
No primary mortality			
(Residual carcinoma in 54.8 per cent of removed uteri)			

III. *Adequate surgery with preliminary radium (planned technique).*—We have been quite a long time in arriving at the most promising part of this presentation. Table IX deals entirely with those patients in whom we have carried out, under our own supervision, a definitely planned technique whenever possible since 1935. The first patient was so treated, however, in 1932, and she has survived for thirteen years. The remainder are alive from five to seven years, thus making up the 90 per cent survival rate. The one death in this group occurred four years after treatment, and was due to cancer. The initial symptom was a metastatic nodule in the vagina. There had been no postmeno-

pausal bleeding. During the past five years, 21 more patients have been treated according to plan, of whom one died suddenly of an embolism two years after treatment. There was no autopsy, but the attending physician said that there was no gross evidence of recurrent cancer. There are six four-year survivors; five have survived from two to three years, and the remaining nine approximately one year, more or less.

Our procedure has been pretty well standardized. Whenever we suspect the possibility of endometrial carcinoma, preparation is made for diagnostic curettage, and radium capsules are available for immediate intrauterine application. If there is no physical contraindication to use of the radium, either 50 or 100 mg. are placed in situ, while the curettings are examined by an especially rapid staining paraffin technique which enables us to get a report in four hours. If malignant, a dosage of 4,500 to 5,000 mg. hr. is administered. If not malignant, dosage suitable to a benign condition is employed. If we consider the patient to be a favorable risk, complete surgery is carried out, preferably in six to eight weeks. We have gradually increased our conception of what constitutes a good surgical risk, and we endeavor to follow through with surgery in every possible instance. If there is visual or palpable evidence of carcinomatous extension, or if recurrence is noted, then follow-up x-ray would have to be relied upon. We do not favor it merely as a routine postoperative measure, because of the unpredictable effect upon the intestinal tract. Thus far, none of the patients in this series have received any. In only one patient was carcinoma definitely found outside the uterus, and that was in an ovary. In another patient, the possibility of a concomitant Brenner tumor of the ovary has been considered.

Except in one case, it was thought clinically that cancer was still confined to the uterus, and this was pretty well borne out by the pathologic reports. In 17 uteri (54.8 per cent) residual carcinoma was found, often attenuated, sometimes infiltrating. Usually, alteration of the architecture of the growth, marked destruction, necrosis, and even ulceration of the endometrium have been reported. This fact alone should be of consolation to us when we have to depend upon irradiation therapy in the patient unsuited to operation for any reason. There was nothing too unusual with regard to the symptomatology. An average delay period of six months or so was frequently noted. The majority of the patients were in the 50's and 60's; only six were under 50 years of age.

Nearly two-thirds of the lesions were classified as low-grade malignancies; the remainder were evenly divided between intermediate and high-grade ones. Three of the latter are among the five-year survivors. No conclusions can as yet be drawn from this information, except to say that, in our experience, low-grade lesions often do very well with radium alone, and certainly do so with surgery. Perhaps that is because there are more of them observed in a relatively large series of patients. Radiosensitivity and radiocurability are not synonymous terms in the belief of most of us.

We feel that radium has a distinct advantage when used preoperatively; not only because it causes local cancer destruction, but because it may devitalize the growth, even at some distance from the radium and without altering its microscopic appearance. This we cannot prove, but it is our impression that if such an action is possible, it may be a factor that tends to discourage local recurrence after surgery. Then, too, we have noticed a general improvement in some patients between the time that the radium was applied and the time of the operation. There was no primary mortality in the preirradiated group, furthermore.

Preoperative x-ray probably acts in the same way. A few years ago, Norman Miller and our group agreed to follow our respective ways with relation to our methods of preoperative irradiation—he used x-ray, and we used radium.

TeLinde, of Baltimore, uses both—radium before, and x-ray after operation. Kamperman uses radium and x-ray preoperatively in some instances, and postoperative x-ray in all.

All that we can do is to show our results to date. It will take much more time and a continuation of our present methods to tell whether we are on the right road and, furthermore, whether we are going in the right direction. We hope and think that we are, as do a goodly number of us (Healy, Ward, Schmitz, and recently, McLennan).

TABLE X. FIVE-YEAR RESULTS OVER-ALL PICTURE

TREATMENT	PATIENTS	SURVIVORS	PER CENT	
Surgery	12	5	41.6	
Irradiation	55	22	41.8	
Surgery and Irradiation (Unplanned)	27	8	29.6	46.0
Radiation and Surgery (Planned)	10	9	90.0	
	104	44	42.3	

PRIMARY MORTALITY

87 Patients, Surgery performed	(2) 2.3
79 Patients, Uteri removed	(2) 2.5
74 Patients, Uteri Removed (Jeff.)	(2) 2.7
31 Patients, Uteri removed (planned)	0.0

Table X merely indicates how the over-all picture fails to tell the true story in distinct brackets as far as relative five-year survivals are concerned. There are numerous individual variants that have been mentioned. That is why we came to realize that our report of three years ago was cumbersome and misleading with respect to the advances that we felt sure we were making. The relative five-year survival figures then read as follows: surgery alone, 18.1 per cent; irradiation alone, 40.5 per cent; surgery and irradiation, 38.4 per cent (corrected for uteri actually removed, 42.9 per cent). For all cases, irrespective of treatment, 39.1 per cent. The primary mortality, however, gives a clearer picture when viewed from an over-all position, for which we may be grateful.

Summary and Conclusions

1. In this report emphasis has been placed upon a comparative study of the results obtained in the treatment of fundal carcinoma based upon a critical analysis of the conditions noted and the type of treatment employed in each of several groups of patients, rather than upon an over-all estimate of the end-results obtained without respect to the status of the individual case and the treatment employed.

2. This analysis has shown that in our experience a planned technique of preliminary irradiation with radium, followed by adequate surgery in eight to ten weeks, has resulted in a five-year survival rate of 90 per cent among a group of 10 patients, with 20 additional patients among a group of 21 now surviving from one to four years, and without operative mortality.

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Discussion

DR. CHARLES A. BEHNEY.—One is impressed with the careful study and treatment which the patients comprising the material in this paper received. The results of treatment have been analyzed with painstaking care and thought.

The seemingly high immediate mortality rate for the surgically treated patients simply demonstrates how misleading conclusions drawn from a small series of patients may be. In fact, the great disadvantage in breaking up material into so many categories is that each group comprises so few cases that unusual conclusions should be viewed critically. I believe that this is why the authors present their material and statistics with a request that they be utilized in connection with reports from other clinics, treating patients in a similar manner, so that eventually a large enough series will be secured to make the statistics thoroughly conclusive.

The group of patients regarded unsuitable for surgical treatment interested me particularly. One cannot have a standard treatment for carcinoma of the fundus any more than for any other disease. Certainly, those hypertensive, cardiac decompensative, terrifically obese, etc., women were given a better chance for survival by treating them radiologically than if they had been subjected to the strain of panhysterectomy. It sometimes seems unfortunate that so much emphasis is placed on the five-year survival rate. If the patient is spared from the discomfort and torment of death from cancer, she represents a victory over that disease, whether she lives two months or twenty years after treatment. We cannot agree that a hypertensive patient treated with radium, who dies three years later from a cerebral hemorrhage, should be classified as a failure.

It is interesting to note that among the cases reported, those who had hysterectomies after preoperative radium irradiation showed residual carcinoma in 54.8 per cent of instances, and that the salvage rate in those cases who were treated radiologically and without surgery was 45 per cent. These two observations check so perfectly that it would seem that radium irradiation alone cannot be expected to destroy completely the carcinoma in the fundus of the uterus in more than 45 per cent of the cases. As has been stated, this in itself is sufficient reason for augmenting preoperative irradiation with radical surgery. There is another indication for supplementing irradiation with total hysterectomy. There have been instances in our experience where the intense effect of the radium on the carcinoma produced such extensive necrosis of the uterine wall that perforations and peritonitis followed. This is particularly true when the disease is extensive and when the tumor is especially radiosensitive. Consequently, it is our practice to perform total hysterectomy, regardless of how well our patients seem to do after irradiation.

The essayists again bring up the question of preoperative radium irradiation versus preoperative high voltage x-ray irradiation. One of the arguments in favor of the former is that the preoperative radium irradiation prevents vaginal recurrences. In the group presented, there was one such vaginal recurrence. Another argument in favor of preoperative radium irradiation is that x-ray irradiation is more likely to be followed by deleterious effects on the gastrointestinal tract. By the same token, radium would be less lethal to extensions into the parametrium or other surrounding structures.

An extensive experience with laparotomies following intensive x-ray irradiation for various reasons leads us to disagree with the frequently heard statement that x-ray irradiation makes later surgery more difficult because it produces adhesions, changes in the abdominal wall which interfere with ease of operation or postoperative healing. If the x-ray therapy is administered properly by means of standardized equipment, employing proper

filtration, and sufficient time for the reaction to subside is allowed to intervene before the surgery is practiced, the latter will not be rendered less feasible because of the preliminary irradiation.

In our clinic, we use preoperative x-ray irradiation in certain instances, and in others preoperative radium irradiation, depending upon whether a curettage is necessary to arrive at a definite diagnosis. Many of our patients are seen in the Out-Patient Department, where material is secured from the uterine cavity by means of a suction curette. If the pathologic report demonstrates carcinoma of the fundus, the patient is given preoperative high voltage, external irradiation through four abdominal ports. When, however, it is necessary to perform a curettage in order to make our diagnosis, radium is made available, and we practice a technique similar to that described by the essayists. The radium is inserted at the time of the curettage, and a diagnosis by a quick paraffin method is awaited. If the diagnosis is carcinoma, the radium is allowed to remain as long as necessary to secure the usual carcinoma dose. If, however, the tissue proves to be benign, the radium is removed at the proper time for irradiation for benign bleeding. It is our opinion that there is little to choose between the two methods of preoperative irradiation, annd we select the method which is most convenient to the patient and less expensive to the hospital. In carcinoma of the fundus, as in most other forms of cancer, the ultimate outcome depends more on early diagnosis and prompt treatment than on any differences of technique.

DR. FRANKLIN L. PAYNE.—We are indebted to Dr. Scheffey for his reminder that the policies of treatment in fundal carcinoma remain open to critical discussion and to revision. At the University of Pennsylvania Hospital we recognize three avenues of approach to the problem: surgery alone, a combination of surgery and irradiation, and irradiation alone. The controversial factors rotate around the wisdom of surgery alone, the efficiency of intracavitary irradiation versus external irradiation or the value of the two in combination, and the technique of intracavitary irradiation—both as to dosage and distribution.

The ideal management would consist of the accurate microscopic diagnosis of corporeal cancer and its immediate removal by total hysterectomy and bilateral salpingo-oophorecomy. This eliminates the danger of dissemination by the curettement, reduces the time that is required for treatment, and obviates the psychic trauma of readmission for a second operative procedure. Objections to this plan include the great difficulty in making a certain diagnosis immediately and the possible value of preoperative irradiation as a localizing agent. Despite these deterrences, we believe that the early cases should be so treated, provided an unequivocal diagnosis is made and no contraindication to radical surgery obtains.

Since this ideal is realized infrequently, the plurality of fundal carcinomas must be treated by a combination of irradiation and surgery. The proper choice of the method or the time of irradiation still is open to question, as Dr. Scheffey indicated. Study of irradiated specimens and careful follow-up analyses after internal irradiation on one hand and external therapy on the other, as planned by Drs. Scheffey and Norman Miller, should do much to give us the correct answer. Thus far we agree with Dr. Scheffey that in the operative group the advantages of external irradiation, either alone or in combination with intrauterine applications of radium, do not compensate for its disadvantages and we do not use it. Our present policy consists of intracavitary irradiation to be followed four to six weeks later by operation. Dissatisfaction with the intracavitary irradiation, as it has been applied, has arisen from study of our operative specimens. Our experience confirms that of Dr. Scheffey that about 50 per cent of the previously irradiated uteri exhibit residual carcinoma at the time of their removal. The works of Sampson, Crossen, and many others indict the old practice of applying radium in tandem for corporeal cancer. Recently we have adopted the technique described by Crossen for intracavitary irradiation. It appeals because of its apparent satisfactory distribution and its simplicity of application.

While careful radium distribution is important in the operative cases, it is even more so in those instances in which entire dependence must be placed upon radiotherapy—because of either systemic or local considerations. Here two questions arise: the advisability of combined external and intracavitary irradiation, and the wisdom of multiple

intrauterine applications. Unless adequate external irradiation is precluded by obesity, we treat the inoperable group by both approaches. Because of the recognized dangers of initial overdosage, the external irradiation is administered with the greatest caution, and the intrauterine irradiation is administered in divided doses. The obesity inoperable group is treated only by repeated intracavitary applications.

Since irradiation, when applied within the limits of safety, fails to destroy corporeal cancer frequently, we must hope to feel our way slowly to a more satisfactory technique, or better still to lift some of the patients from the inoperable to the operable bracket. The range of systemic inoperability has been reduced by modern pre-intra and postoperative management, and a similar reduction in local operability may follow further improvements in the technique of irradiation therapy—both external and intracavitary.

DR. SCHEFFEY (Closing).—Many points have been brought up that I would like to comment upon. Dr. Behney is quite right in mentioning the disadvantage of drawing conclusions from a statistical review of small groups of patients. On the other hand, my purpose was to show the unfairness of presenting only the over-all picture with respect to a five-year survival rate, irrespective of the individual problem each patient presents with regard to the physical factors involved, the stage of the disease, and the type of treatment employed—whether it be impossible, inadequate, or carefully planned under favorable circumstances. We have "broken down" the entire series for the very reason that we do wish to evaluate the mortality and the five-year survival rate in the categories mentioned, and in order to show what we have been able to accomplish in a suitable group of patients when it was possible to carry out a definitely planned procedure for these individuals.

If we know for a certainty that a patient who has survived for five years or more has not died of cancer, we do not hesitate to include her as a five-year survivor for statistical purposes. Conversely, even though a patient has passed the five-year standard, and we know that cancer is still present, we should state that fact clearly. We do not want to fool ourselves or anyone else.

Of course we cannot have a "standard treatment" for every patient with fundal cancer. We have brought that out very clearly in this paper, showing the limitations that exist in certain individual instances. We do say, however, that as our experience has increased, we have increased our indications for postirradiation surgery more and more, and with increasingly beneficial results. Our experience has shown, too, that one should not rest content with an initially good result from irradiation therapy, but carry through with subsequent surgery; otherwise unarrested disease or recurrence will very probably happen in 45 to 50 per cent of the patients treated with irradiation only. When subsequent surgery is impossible or inadvisable, it is our practice to perform a test curettage and apply more radium if indicated, in about six months or a year using external irradiation in addition, following the initial radium application. If bleeding recurs earlier in patients of this sort, repeat the treatment promptly with another curettage, of course. This is the plan that we have followed in our excessively stout women. This answers Dr. Outerbridge's question.

One must be careful of exceptionally larger doses of radium in relatively small uteri. We had an illustration of this recently in an elderly patient. When she returned for the surgical procedure, the patient told of having had an attack of "intestinal grippe" some time after the radium application. At operation, the small uterus was rather firmly attached to the rectosigmoid which was deviated toward the right side of the pelvis. Thickening of the bowel was present, with evidence of a localized peritonitis. The radium had produced as severe an intestinal reaction as is so often the case with intensive external irradiation for cervical carcinoma.

I grant that our impressions of skin damage as a deterrent to later surgery goes back to the days when we saw more intense reactions from external irradiation. Since then the methods of application have improved tremendously, but in the meantime, having ceased using preliminary x-ray in favor of radium, we have not gone back to it, for we have been anxious to build up a series of cases with radium as the sole preliminary agent, as stated in the paper. We grant that those employing x-ray instead report gratifying results, but we limit

external irradiation to those patients being treated with irradiation alone, or in instances where inadequate surgery has obtained, or where extension beyond the uterus has occurred. Dr. Behney's experience is in accord with Dr. Norman Miller's. Perhaps our future experience and that of some of our colleagues may influence us to change our present method, but we are still desirous of continuing with a plan which shows a five-year survival rate of 90 per cent, together with 20 out of 21 additional patients treated during the past five years being alive and well at the present time—and without any operative mortality. With the exceptions noted, and for the reasons stated, Dr. Behney's management of fundal carcinoma differs little, if any, in principle from ours.

Dr. Payne has brought up a very pertinent question—the efficacy of intracavitary radium applications. We are well aware of Sampson's work of years ago in which he showed the inadequacy of proper action from intrauterine radium capsules when the uterine cavity was irregular or distorted. We have called attention to those cases in which it is impossible to secure a good intracavitary radium application as a preliminary procedure when fundal carcinoma is suspected. In several such instances, when the fundus was especially large and irregular on the outside as well as in the endometrial cavity, because of concomitant myomas, we have resorted to immediate panhysterectomy with adnexal removal, as noted in our paper.

Even before Heymann packed the uterine cavity with multiple, small radium units, Burnham had been doing just that in Baltimore, but he discontinued this technique. We have not employed Crossen's method, or Friedman's either. It seems to have merit, however, and I know that we will await with interest a future report of Dr. Payne's end-results with the method of therapy that he is now carrying out at the University of Pennsylvania Hospital. I am glad that he agrees with us in the principle of the present-day treatment of fundal carcinoma that we have presented, irrespective of the controversial issues that have been mentioned. Truly, every patient must be individualized; only those patients falling into the favorable group that we have described can be managed by a so-called "planned technique."

A CLINICAL EVALUATION OF ECTOPIC PREGNANCY*

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IN THIS presentation we propose to evaluate and comment upon the facts which have been accumulated from our experience with ectopic pregnancy. The importance of such a study becomes apparent in the light of Williams and Corbit's recent analysis of 101 fatalities from ectopic pregnancy. These authors state that in the decade 1931 to 1940 every eighteenth puerperal death in Philadelphia, every sixteenth puerperal death in New York City, and every twelfth puerperal death in Chicago was due to ectopic gestation. In Philadelphia from 1931 to 1943 the mortality was 4.6 per cent. Within the last ten years reports on the mortality rate have ranged from 3.2 per cent to 8.3 per cent; Fitzgerald and Brewer, 7.8 per cent (1935); Falk and Rosenbloom, 8.3 per cent (1936); Ware and Winn, 8 per cent (1941); Farrell and Scheffey, 3.2 per cent (1943); and Siegler, 3.9 per cent (1945).

Incidence

In the Woman's Clinic of the New York Hospital from Sept. 1, 1932, to Jan. 1, 1946, there were 41,365 pregnancies cared for, which include 38,356 full-term and premature deliveries and 3,009 abortions. During this period there were 141 ectopic pregnancies, an incidence of 0.34 per cent, or 1 in 293 pregnancies.

Ectopic gestation was found to occur most frequently in the age group ranging from 25 to 35 years (Table I). The youngest patient in the series was 19 years of age and the oldest 41 years of age. Table I also indicates that over one-fourth of the cases occurred in women beyond 35 years of age. It is significant that in this group late marriage, low fertility, and repeated abortions were factors often encountered in the histories.

Gravidity Antedating the Present Ectopic Pregnancy

An analysis of Table II reveals that 28.4 per cent of the patients had never before been pregnant, and that 43.3 per cent had never previously been delivered of a viable infant. Furthermore, there were only 10.6 per cent who had borne two or more children. These data reflect the generally accepted fact that low fertility and infertility are commonly associated with ectopic pregnancy.

Repeated ectopic gestation was noted in seven patients, or 4.9 per cent. In only one of these was there a previous history of salpingitis eventually verified by pathologic sections.

*Presented at a meeting of the New York Obstetrical Society, March 12, 1946

TABLE I. AGE INCIDENCE

AGE	TOTAL CASES	PER CENT INCIDENCE
19	2	1.4
20 to 24	19	13.5
25 to 29	41	29.1
30 to 34	41	29.1
35 to 39	34	24.1
40+	4	2.8
Total	141	100.0

TABLE II. GRAVIDITY PRECEDING PRESENT ECTOPIC PREGNANCY

GRAVIDITY	TOTAL CASES	NO. OF REPEATED ECTOPIC	PER CENT INCIDENCE
None	40		28.4
1 abortion	11	(1)	7.8
2 or more abortions	9	(2)	6.4
Ectopic	1	(1)	0.7
1 child	30		21.3
2 or more children	15		10.6
1 or more children and 1 or more abortion	35	(3)	24.8
Total	141		100.0

TABLE III. POSSIBLE PREDISPOSING FACTORS

FACTORS		TOTAL CASES	INCIDENCE
Infection		38	26.9%
Appendicitis	23		
Gonorrhea	4		
Pelvic Inflammatory Disease	4		
Tuberculosis	2		
Ulcerative Colitis	1		
Pelvic Infection Following Induced Abortion	4	21	14.9%
Induced Abortion		35	24.8%
Previous Laparotomies			

Etiologic Factors

After surveying the factors that might be immediately or even remotely considered causative or predisposing, from the past and immediate history of our cases it can be concluded that in most instances the etiology is not clear. While it is easy to understand how endosalpingitis effected by gonorrhea predisposes a woman to ectopic gestation, it is indeed questionable whether this specific infection plays the etiologic role formerly attributed to it. Gonorrhea may be as widely prevalent today, but with the newer methods of therapy and their more prompt administration, the damaging results to the oviducts directly or indirectly caused by gonorrhea and by postabortal and postpartum infections may be prevented. Chemotherapy and the administration of penicillin will undoubtedly greatly alter the part that gonorrhea, in particular, and the pyogenic infections, in general, play in the etiology of ectopic pregnancy.

Inasmuch as pelvic and abdominal infections are generally considered to be the most frequent predisposing factors, Table III shows that in only 26.9 per cent of the cases a positive antecedent history of some inflammatory process was obtained that might be even remotely responsible for establishing the

changes favorable for an ectopic pregnancy. Only four patients admitted that they had been treated for gonorrhea, and an equal number stated that severe pelvic inflammatory disease followed an induced abortion. Among the cases of appendicitis, liberally assuming that all appendectomies were performed for appendicitis, there were as many left as right salpingectomies done for an ensuing ectopic pregnancy. More important is the number of times that the diagnosis of salpingitis was made by microscopic examination when the pathologic anatomy of tubal pregnancy was reviewed in each case. This lesion was unequivocally seen only twenty times, or 14.2 per cent. It is doubtful whether this incidence might have been appreciably increased, even if there had been more sections taken for microscopic study from the specimens which did not show the effects of chronic inflammation.

Nearly 15 per cent of the patients had had induced abortions and about 25 per cent previous laparotomies.

Decidual reaction in the stroma of the Fallopian tube was noted on 30 occasions, or 21.3 per cent. Recent studies on the early implantation of the human ovum support the conclusion that the development of decidua is an early effect of nidation rather than a cause.

Without entering into any of the theoretical or mechanical considerations of the etiologic factors, the information that we were able to obtain from our data is not so positive and specific as we had hoped it would be. However, it does place emphasis on the fact that in the greater number of cases the real cause of ectopic pregnancy remains obscure.

Symptoms and Physical Findings

Because of the various pathologic courses that ectopic gestation may follow, the appearance, sequence or degree of intensity of the symptoms, and physical findings are more often atypical than not. Lower abdominal or pelvic pain, abnormal vaginal bleeding, a pelvic mass, and amenorrhea are the four cardinal manifestations of ectopic pregnancy.

Pain is the one symptom that is almost universally present. It was found in 98.5 per cent of our cases. In over half of the patients it was described as suddenly severe, sharp, or knifelike, and usually, under these circumstances, unilateral. The intermittent or cramplike and dull pains were, as a rult, localized in the lower abdomen. Pain alone made its appearance as the first symptom in 23.6 per cent of the patients in this series (Table IV).

TABLE IV. DAYS FROM LAST REGULAR MENSTRUAL PERIOD TO ONSET OF FIRST SYMPTOM
(18 unknown cases excluded)

SYMPTOM	DAYS 0	1 TO 14	15 TO 28	29 TO 42	43 TO 56	57 TO 70	71 TO 79	TOTAL CASES	PER CENT INCIDENCE
Pain		1	4	9	10	5		29	23.6
Bleeding	5	4	7	25	7	1		49	39.8
Pain and bleeding	8	3	3	14	7	8	1	44	35.8
Vaginal discharge						1		1	0.8
Total cases	13	8	14	48	24	15	1	123	100.0
Per cent incidence	10.6	6.5	11.4	39.0	19.5	12.2	0.8		100.0

Abnormal vaginal bleeding was observed in 78.7 per cent in those instances where it could be accurately determined. Bleeding preceded the onset of pain in 39.8 per cent, while it was coincident with the onset of pain in 35.8 per cent of the cases (Table IV).

A pelvic mass was palpated in 99 patients, or 70.2 per cent of the total. In 14 patients pelvic examination was deemed unnecessary or hazardous in view of the typical history and other physical findings, and the acutely ill condition of the patient. In 19.1 per cent of the series no mass was felt.

Amenorrhea was reported by 64.5 per cent of the patients. The shortest period of amenorrhea was five days; the longest, eighty-two days.

The number of days that elapsed between the last regular menstrual period and the onset of the first symptom is also indicated in Table IV. In almost two-fifths of the patients, or 39 per cent, the first symptom appeared from four to six weeks after the last regular period. In 70 per cent of the patients, the first symptom was manifested in from two to eight weeks following the last period.

Weakness and faintness were recorded in 29.1 per cent, while collapse with shock was noted in 12.8 per cent in our series (Table V). Our experi-

TABLE V. WEAKNESS—SYNCOPE—SHOCK

PREOPERATIVE	TOTAL CASES	INCIDENCE
Weakness at onset of pain	12	29.1%
Fainted after pelvic examination	1	
Fainted at onset of pain	28	
Shock after an enema	1	12.8%
Shock after pelvic examination	3	
Shock at time of admission	14	
Total	59	

ence reveals that one patient fainted, and three promptly went into shock after pelvic examination. One sustained collapse with deep shock following an enema. About 10 per cent were admitted to the hospital in shock.

Among the more typical group of cases, twelve (8.5 per cent) complained of shoulder pain.

Nausea and vomiting, hemoglobin and hematocrit levels, red blood cell and white blood cell counts, sedimentation rate, fever, and rigidity of the abdomen are not present with any consistent or characteristic regularity. A persistent or increasingly rapid pulse and a relatively gradual fall in the hemoglobin and cell volume levels are more significant findings.

From these data one may conclude that pain, vaginal bleeding, the presence of a pelvic mass, and amenorrhea are pre-eminent in the history and symptomatology of ectopic gestation. While pain affects nearly every patient, abnormal vaginal bleeding most frequently appears as the first sign.

Diagnosis

Ectopic pregnancy "may well be considered a disease of diagnostic surprises. The physician who has extrauterine pregnancy 'on the brain' will rarely fail to diagnose it when it exists, but he will diagnose it often when it

is not present. On the other hand, one who is not alert to its possibility will meet with many surprises which greater care could have avoided." This quotation from Novak is aptly worded.

Preoperatively, the diagnosis was correctly made in 124 cases (87.9 per cent) of the 141 patients who were operated upon for ectopic pregnancy, and in whom the diagnosis was confirmed. In the remaining 17 cases the incorrect diagnoses were distributed as shown in Table VI.

TABLE VI. PREOPERATIVE DIAGNOSIS, NOT ECTOPIC PREGNANCY. ECTOPIC FOUND AT OPERATION

PREOPERATIVE DIAGNOSIS	CASES
Bilateral tuboovarian masses	1
Chronic pelvic inflammatory disease	3
Ovarian cyst with twisted pedicle	4
Ovarian cyst	3
Myoma uteri	5
Pelvic abscess	1
Total	17

In addition to our series of 141 cases of proved ectopic pregnancy, there were 95 women in whom the diagnosis of this condition was made or remotely entertained, but not found. Of these, 45 had laparotomies, 38 of which seemed justified (see Table VII), and seven unnecessary. Of the remaining 50 patients who did not have a laparotomy, 30 were subjected to an examination under anesthesia, at which time 22 were found to have an intrauterine pregnancy, while 20 had a dilatation and curettage, and in 13 of these an incomplete abortion ultimately proved to be the correct diagnosis.

Should one, therefore, consider not only the 141 patients with proved ectopic pregnancy, but also all those in whom this diagnosis was entertained, however remotely, we find that of the total 219 cases a correct diagnosis was made in 124 (56.6 per cent).

TABLE VII. PREOPERATIVE DIAGNOSIS, ECTOPIC PREGNANCY. ECTOPIC NOT FOUND AT OPERATION

POSTOPERATIVE DIAGNOSIS		CASES
Salpingitis		13
Subacute	5	
Chronic	8	
Hematosalpinx		6
Alone	4	
With endosalpingeosis	1	
Following Rubin's test	1	
Ovarian cyst		13
Corpus luteum	7	
Simple serous	3	
With twisted pedicle	2	
Endometrial	1	
Myoma uteri		2
Adenomyosis		1
Hematocele		1
Retroversion		1
Acute appendicitis		1
Total		38

For the most part, we have relied upon the history, symptomatology, and physical findings to arrive at the diagnosis. As additional diagnostic aids, posterior colpotomy was performed on only three occasions, and aspiration of the cul-de-sac on one occasion; in each case the findings supported the proved diagnosis. Pregnancy tests were utilized on 37 occasions and were of value in only a few cases.

Six patients passed decidual casts and 10 patients had a curettage before laparotomy. Six of this latter group corroborated the diagnosis, and four did not.

It is noteworthy that there were 25 cases, or 17.7 per cent, that did not have any demonstrable blood in the peritoneal cavity at the time of exploration.

Accordingly, our data show that the percentage of correct diagnosis is directly proportional to the character of each individual case. It is higher in the more typical cases, lower in the more atypical ones.

Treatment

Torpin states that "an ectopic pregnancy is neglected if the operation is delayed more than a few hours after the first physician first sees her." This thesis may well be applied to those cases in which the diagnosis seems clear even though the operation is not an emergency. However, in the atypical case where the diagnosis is questionable or difficult, a more conservative approach and elective operation need no defense.

In determining the time that elapsed between admission to the hospital and operation, we learned that 24.1 per cent, or about one-fourth of the patients, were operated upon shortly after admission, and an additional 27.7 per cent within the first twenty-four hours. A total, then, of 51.8 per cent, or a little more than half of the cases in our series, had the operation on the day of admission. Within two days of admission, a total of 70.2 per cent came to laparotomy. After the fourth day, there were 22 cases that offered problems of differential diagnosis. Pelvic inflammatory disease was considered 10 times; threatened abortion, seven; and myoma uteri with infection or degeneration, five. The longest interval of time elapsing between the day of admission and day of operation was twenty-four days in a case of pelvic inflammatory disease with bilateral tuboovarian masses and unsuspected ectopic pregnancy.

There were 41 salpingectomies and 15 salpingo-oophorectomies performed on the right side, 38 salpingectomies and 26 salpingo-oophorectomies on the left, 16 bilateral salpingectomies and five cornual resections for interstitial pregnancies. A hysterectomy was indicated and combined with some of the above procedures on 11 occasions.

Transfusions were given to 60 patients, or 42.6 per cent of the total. Fifty (35.5 per cent) of them required it preoperatively or during the operation, and there were 19 int his group who, in addition, received transfusions postoperatively. Ten cases were given blood only after operation.

Mortality

There was one death in this series, or an incidence of 0.71 per cent. In the light of what is now known of the accidents and fatalities that may result from the transfusion of Rh-positive blood to an Rh-negative recipient, we feel that a brief summary of the case is warranted.

The patient, aged 36 years, para iv, gravida iv, with a history of cesarean section in 1933 for placenta previa, was admitted to the Woman's Clinic on Dec. 30, 1941, complaining of severe lower adbominal pain and syncope. Her last pregnancy was in 1938, when she was delivered of an erythroblastotic baby, icteric in type, that survived. The last menstrual period in her present illness was Oct. 26, 1941. There was a history of spotting beginning December 1 which lasted five days. Vaginal bleeding recurred on December 28. At 4:00 P.M. on December 30, she was seized with a sudden severe lower abdominal pain. She was in severe shock when admitted to the hospital. Preparations for transfusion were promptly made. She received 500 c.c. of citrated blood preoperatively and another 500 c.c. during the operation. Although her condition was critical throughout the operative procedure, some improvement was noted, and at the end of the operation her blood pressure was 95/70. On the first postoperative day it was observed that the urinary output was only 160 c.c., and on the second day she became jaundiced, with a urinary output of only 100 c.c. She failed to respond to all instituted therapeutic measures, gradually grew worse, and on the morning of the fifth postoperative day at 8:45 A.M. she died of pulmonary edema.

Even though at that time we were not yet testing our patients for the Rh factor, the history of an erythroblastotic baby in 1938, oliguria and jaundice following transfusion, and a terminal pulmonary edema strongly suggest the probability that this patient died because she received incompatible Rh blood.

Pathology

A brief review of the pathologic anatomy is pertinent. Every specimen in our series was carefully examined and described macroscopically and microscopically.

Special interest in the termination of tubal pregnancies prompted us to classify each specimen as accurately as possible. Tubal ruptures were easily segregated as a group. Great difficulty was encountered, however, in attempting to catalog the specimens in which the pregnancy was thought to have terminated as an abortion or as a result of internal rupture of the pseudocapsularis. If, in the presence of a hematosalpinx, we found the ovum still attached to the implantation site, it was considered an instance of intratubal rupture of the pseudocapsularis. It is realized that more thorough studies, such as Litzenberg out-

TABLE VIII. CLASSIFICATION OF ECTOPIC PREGNANCIES

TYPE		CASES	INCIDENCE
Tubal		133	94.3%
Intact	1 (0.7%)		
Abortion	75 (53.2%)		
Intracapsular rupture	23 (16.3%)		
External rupture	34 (24.1%)		
Interstitial		5	3.6%
Secondary abdominal		2	1.4%
Intraligamentary		1	0.7%
Total		141	100.0%

lined in his valuable contribution to this subject, should have been done in order to make our evaluation more accurate and complete. Nevertheless, because there are no figures on the relative frequency of this particular termination of tubal pregnancy, our attempt does give some concrete idea of its incidence.

From Table VIII one learns that 94.3 per cent of the ectopic pregnancies were tubal, 3.6 per cent interstitial, 1.4 per cent secondary abdominal, and 0.7 per cent intraligamentary. Over half, or 53.2 per cent, of the tubal pregnancies were thought to have terminated as tubal abortions, 16.3 per cent as internal ruptures of the pseudocapsularis, and 24.1 per cent as external ruptures of the tube. One of the tubal pregnancies was considered to be still intact. It had not been anticipated that only about one-fourth of the cases would be classified as ruptured tubal pregnancies.

Comment

Many of the facts that were revealed from this statistical study more or less conform to many of those that have already been reported and known. There are a few points, however, that should be briefly discussed.

The incidence of ectopic pregnancy and the age group in which it is more likely to occur, as well as the incidence of repeated ectopic gestation, are in general agreement with current statistics.

Without disputing the fact that infection may still be the most important and most frequent predisposing factor in the etiology, our data convince us that gonorrhea does not play the part formerly ascribed to it. Furthermore, it may be demonstrated in the future that the role of infection will be greatly altered as a consequence of chemotherapy and the use of penicillin. A review of all the factors that we considered possibly causative did not yield the information that we had hoped for. It only projected the fact that, for the most part, the etiology of ectopic pregnancy remains obscure.

Lower abdominal or pelvic pain, abnormal vaginal bleeding, a palpable pelvic mass, and amenorrhea reappear as the four cardinal manifestations of ectopic pregnancy. Whereas pain is nearly always present, in our series, vaginal bleeding more often appeared as the first symptom. It should be pointed out that collapse may follow too many or too vigorous pelvic examinations.

Not only was a correct diagnosis rate calculated in the cases in which ectopic pregnancy was verified, but also in those in which it was even remotely considered.

To arrive at the diagnosis, we have depended greatly upon an accurate history, the symptomatology, and physical findings. It is obvious that in the patients in whom the diagnosis is definite, there is no need for any accessory diagnostic aids. However, in those in whom it is presumptive and suspected, one might use aspiration of the cul-de-sac or posterior colpotomy a little more often. Even with these procedures, it is possible for one to be misled since, in our series, it was noted that there were 25 patients (17.7 per cent) without blood in the peritoneal cavity at the time of operation. We do not subscribe to the need for abdominal pneumoperitoneum, peritoneoscopy or aspiration through the abdominal wall. These procedures are usually employed for differential

diagnosis in cases that are not emergencies, in cases which in any event generally require an exploratory laparotomy.

Pregnancy tests and dilatation and curettage are only of value in few selected instances, and even then are not always reliable.

There is no question but that the best treatment of this illness is surgical as soon as the diagnosis is established and as soon as the condition of the patient permits it. The generous use of plasma and blood transfusion cannot be too highly endorsed for the critically ill patient. The patient admitted in, or suffering from shock, at any time, should be moved to the operating room as soon as it is feasible, and measures to combat collapse promptly instituted or continued in the operating room. When the optimum moment presents itself, operation should not be delayed.

Williams and Corbit, in their analysis of fatalities from ectopic pregnancy, point out that hemorrhage and shock, as might be anticipated, caused the largest number of deaths. Infection was the next most frequent cause. The one fatality in our series, we believe, was the result of kidney shut-down caused by incompatible Rh blood. This accident sounds a note of warning. In extreme emergencies, the administration of plasma and autotransfusion can be utilized until compatible blood is made available.

While it cannot be determined with finality and completeness, our interest in the pathologic anatomy enabled us to obtain some idea of the manner and frequency in which ectopic gestation terminated. The greatest number of cases end as tubal abortions and about one-fourth as tubal ruptures. The attempt to evaluate the number of cases that terminated as internal ruptures of the pseudocapsularis revealed that 16.3 per cent could be so classified.

Summary and Conclusions

1. The incidence of ectopic pregnancy, determined by a study of 141 cases in which the diagnosis was confirmed, is 0.34 per cent, or 1 in 293 pregnancies, at the Woman's Clinic of the New York Hospital.

2. Of the 141 cases of pathologically proved ectopic gestation, the diagnosis was made preoperatively in 124 cases (87.8 per cent). In a total of 219 patients in whom a diagnosis of ectopic pregnancy was entertained, the condition was found in 124 instances (56.6 per cent).

3. About one-fourth of the patients (24.1 per cent) were operated upon shortly after admission, 51.8 per cent within the first twenty-four hours, and 70.2 per cent within the first forty-eight hours after admission.

4. A total of 60 patients (42.6 per cent) received blood transfusions, 50 (35.5 per cent) preoperatively and during operation, and 10 (7.1 per cent) only after operation.

5. In this series, 94.3 per cent of the ectopic pregnancies were tubal, 3.6 per cent interstitial, 1.4 per cent secondary abdominal, and 0.7 per cent intraligamentary. Of the tubal pregnancies, 24.1 per cent terminated as tubal ruptures and 53.2 per cent as tubal abortions.

6. There was one death in this series, a mortality rate of 0.71 per cent.

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Discussion

DR. CLAUDE E. HEATON.—I desire to present the figures for ectopic pregnancy from Bellevue Hospital. In a six-year period at that institution, we did 310 operations for ectopic gestation and found, as Dr. Marchetti did, that the diagnosis was often incorrect, for our percentage of failure was 29.7 per cent. The majority of our cases were ampullary, and we delayed considerably in operating on these cases.

In contradistinction to Dr. Marchetti, we found that the Aschheim-Zondek test was of extreme value. In 60 per cent of our cases this test was positive. Furthermore, we lay great stress on the laboratory findings. The sedimentation rate was sixty minutes or over in two-thirds of our cases, and in less than 8 per cent of the cases it was less than thirty minutes. I might add that the white count was almost universally elevated. Therefore, a slow sedimentation rate with an elevated white count was of significance.

I don't know what the difference is, but in spite of the general use of chemotherapy and penicillin we still meet with many cases of gonorrhea in the Bellevue Hospital Service. On microscopic examination we found in over 50 per cent of the specimens examined that there was no evidence of previous inflammation.

We have also found that the curettage may be very misleading. Occasionally, however, the curette will clinch the diagnosis. I recall one case which was taken to the operating room and operated upon with a mistaken diagnosis. One of the interns had noted a patulous cervix. It would merely have required a preliminary inspection of the cervix and insertion of a sponge-stick to have made the diagnosis. On the other hand, when the curettage shows decidual tissue alone, that in itself may be misleading. We have found decidual tissue alone in a high percentage of incomplete abortions. However, we feel where there is a unilateral mass and a positive Aschheim-Zondek test that the diagnosis of ectopic pregnancy is almost universally correct.

As far as I know, there was no mortality in our series.

DR. WILLIAM E. STUDDIFORD.—With regard to the question of obscurity of the etiology of ectopic pregnancy, I believe that anyone who has spent time on examining tubes after their removal in cases of ectopic pregnancy will find that a rather small proportion of them show any evidence of inflammation at all.

When you consider the etiology of ectopic gestation you have to remember the physiology which takes place during normal passage of the fertilized ovum into the uterine cavity. It is widely held, mostly on the basis of observations in animals, that fertilization takes place in the outer end of the tube. The ovum can develop right away and, during its migration from the outer end of the tube into the uterus, a lapse of time occurs of about four days. Therefore, there is a margin of safety of about forty-eight hours between the delivery of the ovum into the uterus and its ability to implant itself. You can say that the sole factor to account for the ectopic pregnancy is delay in fertilization and the time the fertilized ovum reaches its site of implantation. There are many reasons for that. For example, in a number of ectopics the corpus luteum is present in the opposite ovary and the tube in which the ectopic is found. The essayist has not given us any figures on the migra-

tion of the fertilized ovum. There are many possibilities which will delay the migration of the fertilized ovum to the uterus and, if the delay lasts longer than six days, the ovum is going to implant itself, regardless of where it is—in the peritoneum, in the ovary, on the serosal surface of the uterus.

The other point I would like to discuss is that of patients who go into deep shock. Dr. Marchetti recommends that such patients be taken to the operating room and that appropriate methods be utilized to combat the shock and, once the patient has reached proper condition, operation can be performed. I believe that appropriate methods to combat shock should be instituted, but at the same time operation should be carried out, regardless of what the patient's condition may be. They do not require an anesthetic, they require oxygen, and they require the Trendelenburg position. As soon as the bleeding point is controlled, the patient rapidly comes out of the shock.

DR. HARVEY B. MATTHEWS.—I would like to ask Dr. Marchetti, why not separate the 141 proved cases into ruptured and unruptured ectopics? It has always seemed to me—and, of course, it is perfectly obvious—that the best time to treat ectopic is before rupture, and we believe that if the patient is seen early enough, the diagnosis can be made before rupture, and that certainly is more ideal than after rupture has occurred. So perhaps the doctor can give us some idea about those which were unruptured and those in which there was rupture at the time the patients were seen.

Dr. Marchetti stated that they do cul-de-sac puncture or needling in only a few cases. We believe that is out altogether. Nowadays, without better equipment and better diagnostic acumen, it seems to me that those two procedures for the diagnosis of ectopic gestation, ruptured or unruptured, are obsolete.

A point that I would like to take issue with him is the question of amenorrhea. We do not observe amenorrhea so often. I prefer to call it an abnormal period, or an abnormality in the sequence of the period, because some of the cases that the doctor showed were not really amenorrhea for the reason that they had gone only ten, fifteen or less days before they had symptoms of the ectopic, and I would not call that amenorrhea. You should call it an anomalous period.

In regard to the question of the time of operation, I agree with Dr. Marchetti and I do not agree entirely with Dr. Studdiford, because in our experience we have found that these patients recover and there is plenty of time for the operation before they go down again, and that is the time that Dr. Marchetti is talking about. I believe the kind of case that Dr. Studdiford has in mind is the interstitial. If you wait on those you do lose, or are very apt to lose, the patient. I think you will lose more patients if you work simultaneously with the shock treatment than if you wait until they recover somewhat and then begin to operate. You do not have many of the interstitial type; I think I have operated on only two patients with an interstitial pregnancy in my entire experience, where, as Dr. Studdiford says, they do not need an anesthetic they are so down and out; you operate with morphine only and then give 2,000 c.c. of fluid during and immediately after the operation, as was done in one of the cases, and the patient recovered. The other was years ago when we did not have blood transfusion and that patient died. But these patients always come back if they are not too far gone and you will save more of them by waiting until they come back than if you operate when the blood pressure is so low that it is hardly readable.

DR. NELSON B. SACKETT.—First, I would like the doctor's comment for and against resection of the tube instead of salpingectomy. I think I am echoing Dr. Ward in saying that resection of the tube is a very dangerous procedure, and that the worst case of interstitial pregnancy we ever encountered was such a case in which the tube had been previously treated by resection instead of salpingectomy. The patient had a nearly fatal interstitial pregnancy. I have had two patients, one of whom is in Dr. Marchetti's series, in whom an ectopic recurred on the opposite side in less than a year. Now the latter patient is most anxious for children, but has no tubes and one normal ovary.

In reference to etiological factors, I would like to ask Dr. Marchetti how many patients were found to have a simple retroversion.

A third point is the matter of hematosalpinx. Dr. Plaut, formerly a pathologist at the Woman's Hospital, presented at our staff conferences on more than one occasion, cases of ectopic gestation in which the ectopic was confirmed after the gross and preliminary diagnosis was hematosalpinx; and he has made the point that without multiple, or even serial sections, it is well nigh impossible to exclude ectopic pregnancy as the cause of the hematosalpinx.

DR. MARCHETTI (Closing).—To answer Dr. Studdiford's question is precisely to do nothing but substantiate his discussion. Really, I do not think there is any argument or discussion about the role of mechanics as an etiological factor in this condition. There may be something intrinsic in the fertilized ovum itself, and we know that those things happen, but exactly to say what the real predisposing cause is I do not think is possible; or that one thing was the producing or causal factor for the mechanics that eventually ended in ectopic pregnancy. For example, it would be quite difficult to say: "Here are twenty tubes in which we found congenital diverticula of the tube." That is very difficult.

The other thing is that Dr. Matthews' remarks serve as corroboration. I don't mean to say that you should wait a long time, but as soon after a patient in shock begins to pick up, then the time of operation should not be delayed, and when there is a needle in the vein preoperatively, if the patient must be moved from some place to the operating room, it is advisable and really mandatory to have that connection in place, not to remove it, but to carry the patient with fluid and plan to give more fluid when she gets into the operating room.

I cannot answer Dr. Matthews' question as to how many of these cases were ruptured and how many were unruptured on admission. I could say about 30, but I am not sure of that. We know that at least 24 of the 124 were diagnosed as ruptured ectopic.

As to amenorrhea, I think Dr. Matthews is quite right about that. It is hard to say; we tried to determine. We just had to give it a name. You can call it an anomalous period if you wish. But in most of these instances there were some with a delay of ten or fifteen days in the next period, and they also had a previous irregular history. We threw those out, of course. A patient will say: "I have a 28-day period;" we know she does not have it regularly—it may be 26 days; or she may say that she has a 29-day period, so four days were excluded.

As to resection of the tube, I would say that, in general, we had three instances of cornual pregnancy in tubes which were previously resected, so I think it is less of a tragedy for the woman not to have her tubes, and perhaps not to be able to have a baby in the future than to run the risk of losing her from a serious ruptured cornual or interstitial pregnancy; that, too, in the case of patients who are anxious to have babies and who ask not to take out the opposite tube. If it is infected or there is any gross pathologic distortion, it is better if the opposite tube is removed. That may appear radical in some cases.

There was one patient in whom we were sure there was a retroversion. That was the only one we could find. At operation there were five cases in which the uterus was definitely retroverted.

The point about hematosalpinx is a good one. As I say, in all of these you cannot say whether the hematosalpinx is the result of the ectopic, that either has been completely ablated from the tube and absorbed in the peritoneal cavity, or whether it is hematosalpinx from some other cause. You may have noted that there were one or two associated with ovarian cyst with a twisted pedicle.

ENDOMETRIOSIS IN ASSOCIATION WITH PREGNANCY

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ENDOMETRIOSIS has received much attention in the gynecologic literature since it was originally described by Russell[1] in 1899. Sampson,[2] in 1921, was the first to propose the theory of its etiology from implantation of endometrial fragments regurgitated through the Fallopian tubes during menstruation.

The apparent increase in the incidence of endometriosis has been distressing. Holmes[3] found 80 proved cases of external endometriosis in 307 gynecologic laparotomies, an incidence of 26 per cent. Sampson[4] has reported finding endometriosis in 43 per cent of abdominal operations performed on women between the ages of 30 and 50 years. Meigs[5] made a gross diagnosis of endometriosis in 36 per cent of 400 consecutive female patients at laparotomy, with pathologic confirmation in 28 per cent. Our experience with patients on the private gynecologic service of the North Carolina Baptist Hospital has closely paralleled that of this last group.

The literature has been concerned primarily with the etiology, pathology, diagnosis, and treatment of this disease. Although numerous series of cases have been reported and the gynecologic aspect of the condition has been fully discussed, the only obstetric factors which have received much consideration are the incidence of infertility and sterility, and the complications which may occur when pregnancy and endometriosis are associated. In 1944, however, Scott[6] reviewed the literature on endometriosis in pregnancy. He found only 47 reports of such cases, and added two of his own.

Obstetric Complications

A brief summary of Scott's collected cases is given in Tables I to IV. Of the 31 patients in whom the probable ultimate result can be ascertained, two had spontaneous abortions and 10 had their pregnancy interrupted by operation (Tables I and II). Two of these patients had criminal abortions, and in two cases pregnancy was an incidental finding at operation. In one case operation was required for traumatic rupture of the uterus, which was probably not related to the endometriosis. Three ectopic pregnancies were found at operation; one (Sampson's) occurred in a patient who had had a tubal ligation, and another was a *left* ectopic pregnancy in a patient with an adenomyoma of the *right* uterine horn.

In 15 of the patients, delivery of a viable child was possible (Table III). Four of these were delivered by the vaginal route, and nine by cesarean section. In two cases the method of delivery was not stated. In two of the four

TABLE I

END RESULT OF ENDOMETRIOSIS AND PREGNANCY	LOCATION OF LESION			REMARKS
	INTERNAL	EXTERNAL	OTHER	
Abortions:				
Spontaneous				
Vignes[12]		+		Spontaneous abortion at twenty-second week. Rectovaginal nodule excised.
Von Franqué[13]		+		Ovarian endometrial cyst removed in sixth week. Spontaneous abortion on thirty-eighth postoperative day.
Operative				
Ascheim[14]	+			Criminal abortion. Hysterectomy for rupture. Actual perforation not seen but adenomyosis found.
Schugt[15]	+			Criminal abortion at fourth month, uterus ruptured at digital completion of abortion; endometriosis found at site of rupture.
Peralta Ramos[16]		+		Continued vaginal bleeding after second criminal abortion. Endometrial cyst resected from right ovary.
Milnor and Tilden[17]			+	Therapeutic abortion for toxemia. Inguinal tumor removed. Diagnosis: endometrial cyst.
Rushmore[18]			+	Therapeutic abortion in woman who had increasing bleeding from cervix and an endometrial polypoid mass.

TABLE II

END RESULT OF ENDOMETRIOSIS AND PREGNANCY	LOCATION OF LESION			REMARKS
	INTERNAL	EXTERNAL	OTHER	
Ectopic Pregnancy:				
Cullen[19]	+			Unruptured left tubal pregnancy. Adenomyoma in right uterine horn.
Sampson[20]	+			Ectopic pregnancy in an area of endometriosis at left uterine cornu following an attempted tubal sterilization.
McKenzie[21]		+		Endometriosis and ruptured ectopic in same ovary. Patient also had cul-de-sac endometriosis.
Incidental Pregnancy at Operation:				
Sampson[4]		+		Intrauterine 14 mm. pregnancy and ovarian endometrial cyst found at operation for myoma uteri.
Amos[22]	+			Adenomyosis found at hysterectomy in five months' pregnancy.

vaginal deliveries, the labor was uncomplicated. In the two complicated cases endometriosis may or may not have contributed to the difficulties. In five of the patients cesarean sections were performed because of rectovaginal endometriosis or a mass in the obstetric pelvis; the indications in the remaining four patients were previous cesarean section, contracted pelvis, ruptured endometrioma, and placenta previa.

Spontaneous rupture of the uterus occurred in three patients (Table IV). In one of these cases numerous contributing factors unrelated to the endometriosis were present.

One patient (Table IV) bled to death from placenta previa at the sixth month of pregnancy.

TABLE III

END RESULT OF ENDOMETRIOSIS AND PREGNANCY	LOCATION OF LESION			REMARKS
	INTERNAL	EXTERNAL	OTHER	
Possible Viable Child:				
Vaginal delivery				
Szenes[23]	+			Normal delivery, postpartum hemorrhage followed by vaginal hysterectomy.
Von Franqué[13]		+		Difficult forceps delivery with Dührssen's incisions in women in whom rectovaginal endometriosis previously diagnosed.
Szymanowicz[24]		+		Normal delivery, rectovaginal endometriosis previously diagnosed.
Scott[6]		+		Bilateral ovarian endometriosis. Right oophorectomy, left oophorocystectomy. Subsequent normal vaginal delivery.
Cesarean				
Hay[25]		+		Rectovaginal endometriosis. Two subsequent pregnancies, cesarean sections, one single, one set twins.
Batizfalvy[26]		+		Rectovaginal endometriosis. Subsequent pregnancy with cesarean section, hysterectomy at eighth month.
Portes, Varangot, and Francois[27]		+		Section hysterectomy at seventh month. Rectovaginal endometriosis by biopsy.
Lochrane[28]	+			Section for tennis-ball size adenomyoma and breech presentation.
DeJosselin and De Snoo[29]		+		Section for suspected cul-de-sac sarcoma found to be adenomyoma.
Sackett[30]	+			Repeat section. Adenomyoma present. Hysterectomy for uterine atony.
Possible Viable Child:				
Cesarean				
Olson and Hansmann[31]		+		Low cesarean section for contracted pelvis.
Scott[6]		+		Ruptured ovarian endometrial cyst. Cesarean section. Viable 2,280 Gm. child.
Schweitzer[32]	+			Section for placenta previa. Uterine atony. Adenomyosis found. Hysterectomy.
End-result unknown				
Griffith[33]		+		Recotvaginal endometriosis. Pregnancy normal one month from term.
Harbitz[34]			+	Endometrial cyst of abdominal scar four years after cesarean section. Subsequent pregnancy.

TABLE IV

END RESULT OF ENDOMETRIOSIS AND PREGNANCY	LOCATION OF LESION			REMARKS
	INTERNAL	EXTERNAL	OTHER	
Ruptured Uterus:				
Schäfer[35]	+			Para x, 7 months pregnant with twins. Lifted heavy weight. Ruptured uterus.
Stone[36]	+			Spontaneous rupture at onset of labor.
Richardson[37]	+			Spontaneous rupture at term. Decidual cell infiltration uterus.
Death From Placenta Previa:				
Williams[38]	+			Died from hemorrhage at sixth month from central placenta previa. Extensive adenomyosis found at autopsy.

In summary, it may be said that in only 9 of the 31 patients could an unfavorable course be attributed directly to the endometriosis.

The widely scattered group of isolated case reports summarized above has established the attitude which generally prevails regarding endometriosis and pregnancy. This attitude is typified by Haydon's[7] statement that "Extensive endometriosis is rarely associated with pregnancy. When endometriosis and pregnancy are associated, abortion, premature labor and extrauterine pregnancy may readily occur. In the presence of endometriosis and pregnancy, complications in labor are frequent. These may consist in rupture of the uterus, atony during cesarean section, or critical postpartum hemorrhage."[7]

Fertility and Endometriosis

In five reported series[7-11] comprising 2,078 cases of endometriosis (Table V), approximately 317 patients who were treated conservatively and could

TABLE V

AUTHOR	TOTAL CASES	FERTILITY REPORTED			OPERATIONS		FOLLOW-UP OF GROUP WITH PREGNANCY POSSIBLE		
		CASES	RELATIVE STERILITY	ABSOLUTE STERILITY	CONSERVATIVE	RADICAL	NUMBER	SUBSEQUENT PREGNANCIES	BABIES
Counsellor[9]	884	131	56.5%	32.1%	18.4%	81.6%	55	7	10
Payne[8]	307	238		40.0%	75.0%	25.0%	48	10	?
Haydon[7]	569	447	53.0%	38.0%				19	?
Keene and Kimbrough[10]	118	83	59.1%	40.9%	25.0%	75.0%	14	4	4
Turunen[11]	200				78.0%	22.0%	200	62	?
Total	2,078						317	102	14

reasonably expect to become pregnant were adequately followed up. One hundred two pregnancies were recorded for this group—an incidence of 32.5 per cent. Most of these authors advocated conservative therapy, but Table V shows that in two of the three series in which the figures can be accurately evaluated, radical procedures were employed in the vast majority of cases, conservative therapy being reserved for patients with localized lesions. Scott was sufficiently impressed by the frequency with which pregnancy follows conservative management of endometriosis to make a strong plea for preserving the childbearing function in these relatively infertile women.

One of us (FRL) has adopted an ultraconservative attitude in the management of young patients with endometriosis, many of whom are anxious to preserve their childbearing function. The extent to which this policy has been pursued is illustrated by the two cases reported below.

Case Reports

CASE 1.—Mrs. V. A. C. This 28-year-old white woman was married in 1935, and had one pregnancy, terminating in an uncomplicated spontaneous abortion in March, 1940. A dilatation and curettage was done at this time. Subsequently she began to have dysmenorrhea, which persisted with little or no

change until approximately January, 1942. From that time until her initial examination here on Oct. 10, 1942, a progressive increase in the amount of menstrual bleeding and discomfort caused her to be confined to bed. Two or three days prior to the onset of the menstrual period, which began Sept. 30, 1942, she had noticed a slight brown discharge. During the following eight days the bleeding was so profuse that she used approximately 90 menstrual pads. There had been no associated metrorrhagia or leucorrhea. Neither she nor her husband had used contraceptives during their marriage.

The review of systems and the family and social histories was noncontributory. The only finding of significance in her past history was an operation for a ruptured appendix and peritonitis when she was 11 years of age.

The general physical examination revealed no abormality. Pelvic examination showed a third degree retroversion of the uterus, which was fixed, irregular in contour, and much firmer than normal. Both ovaries were prolapsed into the cul-de-sac with the uterus. They were fixed in this position and were exquisitely tender. The original impression was chronic subinvolution of the uterus and chronic post-abortal pelvic inflammatory disease. The patient was advised to use the knee-chest position and hot douches daily.

During the next two months, two patient's symptoms became progressively worse, with an associated increase in size of the adnexal masses and the uterus. The diagnosis was then changed to pelvic endometriosis, and laparotomy was advised. This was performed on Jan. 18, 1943. The left tube and ovary were found to be fused into a cystic mass approximately 7 cm. in diameter, filled with a thick chocolate material, and densely bound to the adjacent peritoneum and viscera by adhesions. The right tube was normal, but the right ovary, approximately 5 cm. in diameter, contained a cyst filled with chocolate-brown material. The uterus was freed with some difficulty from the peritoneum of the cul-de-sac, and the posterior wall was found to be diffusely infiltrated with a thick material. In addition, there were three isolated nodules measuring 2 to 2½ cm. in diameter on the posterior-superior surface of the uterus.

Because of the patient's wish to have the childbearing function preserved, a total hysterectomy was not done. Instead, a left salpingo-oophorectomy and a fundectomy were performed, and the cystic cavity in the right ovary was evacuated, its wall destroyed with the actual cautery, and the ovary then closed with interrupted sutures of 000 chromic catgut. Approximately two-thirds of the corpus, including an estimated one-half of the endometrial cavity, was removed. The uterus was then closed with three rows of continuous 000 chromic catgut suture. The superior hypogastric plexus was removed.

The patient's postoperative course was uneventful, and subsequent pathologic examination of the excised tissue confirmed the diagnosis of adenomyosis, with associated external pelvic endometriosis. A pelvic examination seven weeks after operation revealed the uterus to be about half the normal size, in the anterior position, and freely movable. The right ovary was palpable, nontender, and approximately normal in size, shape, and consistency.

The patient was completely free of symptoms until January, 1944, when she again began to complain of dysmenorrhea. The pain was entirely localized to the lower right quadrant of the abdomen, and pelvic examination determined that it was associated with the right ovary, although no change in the size or consistency of this organ was observed. Her symptoms became progressively worse, and in May, 1944, the uterus was noted to be enlarged to the size of a six weeks' pregnancy and somewhat irregular in shape, with a rounded, tender nodule approximately 2 cm. in diameter on the right anterior wall. The use of irradiation was discussed with the patient and her husband, who elected to reserve such therapy until her symptoms were more severe.

On Sept. 5, 1944, the patient reported that her last menstrual period had occurred on June 28. She had the usual symptoms of pregnancy, and a Friedman test was positive. The uterus, though of the same irregular contour, had increased considerably in size since the examination in May.

The patient's prenatal course was entirely uncomplicated. On April 16, 1945, eleven days after the expected date of confinement, she reported the onset of slight vaginal bleeding and was admitted to the hospital. The cervix was dilated 6 cm. and completely obliterated, and the head was in the right occiput transverse position below the ischial spines. Labor progressed rapidly, and a live normal female child weighing 2,780 Gm. (6 pounds, 2 ounces) was delivered by an elective low forceps procedure and episiotomy under cyclopropane and oxygen anesthesia. Spontaneous separation of the placenta occurred in twelve minutes, and the third stage was completed with a total blood loss of 150 cubic centimeters.

The patient left the city when her child was three months of age. She had not resumed menstruation, and was successfully nursing her baby. The pelvic findings were essentially unchanged from those recorded before her pregnancy. The uterus was the size of a five to six weeks' pregnancy and irregular in shape, with a rounded nodule approximately 2 cm. in diameter on the superior and anterior surface of the fundus. No palpable masses were present in the left adnexa. The right ovary was palpable, not tender, and within normal limits of size, shape, and consistency.

CASE 2.—Mrs. D. L. J. This 23-year-old white woman had not felt entirely well since the birth of her only child in November, 1937, following a normal pregnancy. She was consistently 10 to 12 pounds under her normal weight, became exhausted on average activity, and required rest periods throughout the day. She had had mild dysmenorrhea during her entire menstrual life. Her periods lasted four days and came at 21-day intervals. Within the past four months, however, she had had fainting spells associated with menstruation, very severe dysmenorrhea, and profuse vaginal bleeding during her entire period. Although no intermenstrual bleeding or leucorrhea had occurred, she had a light brown discharge for several days before and after menstruation.

The patient had numerous additional complaints such as low-grade fever, headaches, and insomnia, which were suggestive of a constitutional disease.

General physical examination was essentially negative, except for a moderate elevation in blood pressure. Pelvic examination revealed no gross abnormalities other than small healed lacerations of the cervix and a mild chronic cervicitis. The uterus was slightly larger than normal, but was smooth and symmetrical, in the anterior position, and freely movable.

Initially it was thought that the patient's menstrual complaints were probably related to a constitutional disease which was responsible for her low-grade fever and mild hypertension. She was therefore referred to an internist, and during the next two years numerous medical studies were made in an effort to ascertain the cause of her fever and elevated blood pressure. She was seen by us on three occasions during this interval, with no apparent change in the pelvic findings.

On Sept. 19, 1944, the patient reported that she had had no improvement in her menorrhagia, and that her dysmenorrhea had become progressively worse during the preceding three months, confining her to bed. At this time the uterus was found to be nodular, slightly tender, and enlarged to the size of a six weeks' pregnancy. Small masses were scattered throughout the uterine wall. The ovaries were found to be normal in size, shape, position, and consistency. A diagnosis of adenomyosis were made on the basis of the changing pelvic findings and the rather typical history.

The problem was discussed with the patient and her husband, and the decision made to institute conservative medical treatment. On Sept. 19, 1944, she was given testosterone (Metandren Linguets) to be taken 10 mg. daily until a total dose of 300 mg. had been ingested. Her next menstrual period began on Oct. 3, 1944, and the patient noticed an appreciable decrease in the amount of pain she experienced, but no corresponding reduction in blood loss.

The patient returned on Nov. 21, 1944, complaining of slight nausea, occasional vomiting, breast soreness, and urinary frequency. The uterus was appreciably larger and was asymmetrical, with a smooth, diffuse enlargement of the left anterior-superior wall. Hegar's sign was present. A diagnosis of intrauterine pregnancy, complicated by adenomyosis and mild hypertension, was made.

The patient's prenatal course was uneventful, and her hypertension was successfully controlled by salt restriction and diet. On June 21, 1945, the blood pressure rose abruptly to 170/100, and the patient was admitted to the hospital. Labor was successfully induced by the administration of castor oil and progressed normally. A male child weighing 3,010 Gm. was delivered spontaneously in six hours. The third stage lasted five minutes, with spontaneous separation of the placenta, and a total blood loss of less than 100 c.c.

During the patient's prenatal and postnatal course she was entirely well, and was relieved of all the distressing symptoms which prevailed prior to her pregnancy. In September, 1945, she resumed her menstrual cycle. Examinations prior to this time revealed the uterus to be normal in size and consistency. In the three months which followed, however, the uterus grew steadily larger and became irregular in shape, and the patient had a progressive return of menorrhagia and dysmenorrhea. On Jan. 16, 1945, a total abdominal hysterectomy was performed. Pathologic examination of the uterus confirmed the clinical diagnosis of adenomyosis.

Summary and Conclusions

Although the information contained in the medical literature leads one to believe that the combination of pregnancy and endometriosis is a dangerous one, we have reported two cases in which patients treated conservatively for endometriosis subsequently conceived and had a normal prenatal course, delivery, and puerperium.

Few specific case reports of uncomplicated pregnancies in patients with endometriosis are to be found, but a careful search of the literature reveals that such cases are mentioned casually in articles which deal primarily with the gynecologic aspects of endometriosis. An analysis of five such articles shows that approximately a third of the patients who are treated conservatively can successfully conceive, and indicates that the vast majority of such patients have a normal pregnancy. For this reason, we wish to re-emphasize the desirability of employing procedures which conserve the childbearing function in youthful patients with endometriosis.

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MANUAL REMOVAL OF THE PLACENTA; A BENIGN PROCEDURE

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NOT many years ago, manual removal of the placenta was considered one of the most dangerous and deadly procedures that obstetricians could be forced to perform, and the average mortality ranged between 10 and 15 per cent.[1, 2] Even as late as 1927, a large series reported from Wurzburg[3] revealed an uncorrected mortality of 8.2 per cent. Since 1940, the rate has dropped to roughly 1 to 3 per cent.[1, 4-8, 10] Undoubtedly the advent of chemotherapy and a stricter aseptic technique has been a significant factor in reducing both the mortality and the morbidity. The latter, however, still remains high (approximately 42 per cent)[1, 6, 8] in most of the current series reported. One gathers the impression that a moderate mortality and high morbidity are the inescapable accompaniments of manual removal per se. We have not found this to be so. It is the conditions associated with most manual removals, rather than the procedure itself, that have proved to be the cause. The following series is presented as evidence that manual removal is not the primary cause of postpartum mortality or morbidity.

Material

The following 45 consecutive cases were all delivered in the relatively short period of two years, lending the advantage of unified control of procedure, by the same visiting and house staffs of the Massachusetts Memorial Hospitals. Two cases have been added because of their instructive features; one was referred to us three days post partum, and the other was followed in consultation at an outside hospital.

Indications

The most important indications for manual removal were blood loss, retention of the placenta, and a desire to explore the uterus. Blood loss was the predominant indication. Excessive loss was the indication in 15 patients (33.3 per cent), and significant but not excessive loss in 22 patients (48.9 per cent). The criterion of significant and excessive blood loss has purposely been varied, since some patients tolerate blood loss much less readily than do others. Often the degree of tolerance can be correlated with the patient's size and general stamina. In any case, a falling blood pressure or a steady, even if not profuse, loss of blood has been taken as sufficient indication for manual removal, provided that the placenta cannot be immediately delivered by the usual methods. To wait for signs of beginning shock, or until a definite stated amount of blood has been lost, is to invite all the hazards attendant on any surgical procedure on a patient in or bordering on shock.

If the blood loss was profuse at any time, even immediately following the birth of the baby, manual removal was done at once. An approximate clinical estimate of the average amount of blood loss associated with this group is 350 c.c. Although this is well under 500 c.c.,[1, 5] the figure usually quoted for a blood-loss indication, it has been our experience, as pointed out above, that many patients just past the exhaustive efforts of labor cannot withstand even this amount of blood loss without seriously increasing the risks of manual removal, should

this have to be done. Without question, invasion of the uterus per se, without further blood loss, is enough to throw the patient into shock, if she is already in a borderline state of shock. It has, therefore, been our policy to resort to manual removal as a prophylactic measure whenever blood loss is persistent or threatens to become profuse, rather than to wait until it has become so and the obstetrician is forced to invade the uterus at a time when the patient is least able to withstand the procedure.

Retention of the placenta was the second most frequent indication for manual removal, occurring in eight cases (17.8 per cent). Without blood loss, forty-five minutes has been taken as the average length of time it is profitable to wait for separation to occur. Numerous authors[9, 14] attest to the fact that separation normally occurs within the first five minutes of the third stage, although expulsion of the placenta may be delayed for some time thereafter. If gentle suprafundic pressure twenty-five minutes after the end of the second stage did not result in delivery of the placenta, an extremely gentle application of the Credé method was employed. This was not repeated more than twice in the next twenty minutes, after which manual removal was done. That the Credé method be applied gently is imperative, since otherwise, like invasion of the uterus, it has a shocking effect on the patient, thus increasing the risk of shock at the time of the manual removal. Waiting longer than forty-five minutes before using the Credé method has been fruitless in our experience. After that time the cervix has usually contracted, so that expulsion without invasion of the birth canal is unlikely.

Technique

The majority of all our deliveries are aided by episiotomy. On delivery, 10 international units of obstetric pituitrin is given intramuscularly. Local redraping is then done preparatory to repair of the episiotomy. If at any time the bleeding becomes profuse or is present as a steady continuous flow, the repair is interrupted and preparation for removal is begun. Otherwise, the repair is completed with the exception of tying the final knots or, in the case of the frequently used "no-knot" type of repair, it is completed to the point of the subcutaneous burying of the suture ends. By this method we have found that delivery of the placenta or manual removal can still be accomplished without damage to the repair. Frequently, spontaneous delivery of the placenta or signs of separation followed by expression of the placenta occur during the repair period. If delivery has not occurred, expression is attempted by suprafundic pressure when the repair has been completed, this usually being twenty to twenty-five minutes after delivery. If expression is unsuccessful and there is no notable bleeding, approximately twenty minutes is allowed to elapse, during which time two attempts to deliver the placenta by the Credé method are made. If the placenta still remains undelivered, the accoucheur changes his gown and gloves, the patient is kept under anesthesia and is completely redraped and repainted with antiseptic, and manual removal is done in the usual manner. Great care is always taken to identify the cleavage plane between the placenta and uterus before removal is attempted in order to rule out placenta accreda. A sterile Western strip is always at hand before the procedure is begun in the event that uterine packing becomes necessary. Ergotrate is withheld until the delivery of the placenta has been accomplished, when 1/320 grain is given intramuscularly. Uterine tone and hemorrhage following the removal are evaluated, and if there are any signs of atonicity or continued oozing of blood, a tight uterine pack is inserted. Transfusions and intravenous fluids are given as indicated at any time in the above procedure, but we have found that early manual removal before the patient has entered a state of borderline shock obviates their routine use (Tables II and VI).

TABLE I. ANALYSIS OF INDICATIONS FOR REMOVAL*

INDICATION	CASES NO.	CASES PERCENTAGE	AVERAGE TIME BEFORE REMOVAL	MINIMUM TIME BEFORE REMOVAL	MAXIMUM TIME BEFORE REMOVAL
Blood loss	15	33.3	8.1	0	28
Prophylactic for blood loss	27	48.9	14.1	1	33
Retention of placenta	8	17.8	51.7 (75.9)†	38	68 (245)†

*Times given in minutes after delivery.

†One case was unusually prolonged owing to transportation time following delivery at home.

The series presented is divided between ward cases, handled under supervision by the residents, and private cases, delivered by the visiting staff. The procedure was identical for both groups, the only difference between them being that private patients remained in the hospital on the average of one day longer than did ward patients. Manual removal of the placenta was not found to increase the time of hospitalization in either group (Table III).

TABLE II. ANALYSIS OF CLINICAL DATA

	NO. OF CASES	PERCENTAGE
Mortality	0	0
Morbidity	1	2.2
Chemotherapy	22	48.9
No chemotherapy	23	51.1
Intravenous therapy	12	26.7
Shock	0	0
Subclinical shock	3	6.7
Uterine pack	5	11.1
Totals	45	100.0

TABLE III. AVERAGE HOSPITAL STAY (IN DAYS)

	WARD CASES		PRIVATE CASES		ALL CASES	
	NO.	AVERAGE	NO.	AVERAGE	NO.	AVERAGE
Nulliparous	5	9.2	13	10.5	18	9.8
Multiparous	21	8.2	6	8.3	27	8.2

Mortality and Morbidity

No mortality was encountered in this series.

Morbidity, defined as a temperature rising to 100.4° F. or above on two consecutive days, was encountered in only one case (2.2 per cent). This patient was admitted in a morbid condition following the spontaneous home delivery of a macerated stillborn infant of seven months gestational age. She had a marked upper respiratory infection, with an admission temperature of 99.2° F., which was subsequently diagnosed as tracheobronchitis. Manual removal was indicated not only by placental retention, but also by persistent moderate bleeding, with a slowly falling blood pressure reading 92/82. The removal was done four hours after delivery, following a transfusion with 500 c.c. of whole blood. The postpartum course was also complicated by a recurrent pyelonephritis, as well as the tracheobronchitis. Thus, it seems reasonable to attribute the morbidity to a pre-existing infection rather than to the manual removal. This being the case, the corrected morbidity for the series would be 0.

Gestational Age and Parity

The gestational age and parity were as follows: 35 patients (77.8 per cent) had full-term deliveries; 6 patients (13.3 per cent) were delivered in the third trimester of pregnancy; 4 patients (8.9 per cent) were delivered in the second

trimester of pregnancy; 18 patients (40 per cent) were primiparas; and 27 patients (60 per cent) were multiparas.

The only statistical change due to gestational age and parity is noted in the length of hospitalization. Nulliparas averaged 1.6 days longer in the hospital than did multiparas (Table III).

Uterine Packing

Uterovaginal packing was resorted to in five cases (11.1 per cent). In none of these was a second packing required when the original pack was removed twenty-four hours later, although in each case preparations were made to do so before the pack was removed. Chemotherapy, in the form of sulfadiazine, 2 Gm. orally or 2.5 Gm. of the sodium salt intravenously, was started at once and continued every four hours, 1 Gm. orally with 2 Gm. of sodium bicarbonate, until the temperature had remained within normal limits for three days. The morbidity was not influenced by packing, although a slight rise in temperature was frequently noted toward the end of the twenty-four hour period. In every case, this returned to within normal limits immediately after the pack was removed (Table VI). We are not in agreement with some authors[5, 10] who state that packing not only greatly increases the morbidity rate, but also increases the incidence of severe puerperal sepsis.

TABLE IV. ANALYSIS OF PARITY AND GESTATIONAL AGE

NO. OF WEEKS	PARITY											TOTAL
	0	i	ii	iii	iv	v	vi	vii	viii	ix	x	
40+	14	11	3	3	1	1		1			1	35
36+	1	1										2
32+							1					1
28+	2				1							3
28	1	2	1									4
Totals	18	14	4	3	2	1	1	1	0	0	1	45

Shock

No cases of true shock occurred in the series, but three cases of subclinical shock occurred, characterized by a rapidly falling blood pressure (Table II).

TABLE V. ANALYSIS OF CASES IN WHICH THE UTERUS WAS PACKED

CASE NO.	MAXIMUM TEMPERATURE		HOSPITAL DAYS
	WHILE PACKED	24 HR. AFTER PACKING	
307,641	98.6°	100.8°	8
310,251	100.0°	100.6°	13
301,732	99.2°	99.4°	12
310,561	100.2°	99.0°	8
315,239	100.0°	98.8°	11
Averages	99.6°	99.7°	10.6

CASE 1.—A 40-year-old gravida xii, para xi was delivered, by low forceps, of an 8 lb., 9 oz. infant after a short, easy labor. Immediately after birth there was a profuse flow of bright red blood. The patient was instantly prepared for manual examination to ascertain the source of bleeding. Two moderate-sized bilateral vault tears were found, with considerable oozing of blood. A small lateral cervical tear was also present, and bleeding from this point was profuse. The cervix was remarkably soft, friable, and engorged. The placenta was low

down on the posterior wall of the uterus, accounting for the condition of the cervix. It was partially detached, and there was considerable bleeding from the placental site. A good cleavage plane was found between the adherent portion of the placenta and the uterine wall; the placenta was manually removed. The cervical and vaginal tears were rapidly repaired, controlling all hemorrhage. While the repair was in progress, the blood pressure began to fall, and a transfusion of 1,000 c.c. of whole blood was given. The blood pressure immediately began to rise, reaching its normal level four hours post partum.

Owing to the rapid identification and control of the sites of hemorrhage, in which manual removal of a partially separated placenta played an important role, and the immediate institution of antishock therapy, this patient never went into shock. The postpartum course was uneventful. The maximum temperature for the entire hospital stay was 99.4° F.

CASE 2.—A 28-year-old gravida iii, para ii, due to deliver on April 13, 1945, was admitted in early labor on April 7. There had been a slight show of blood, but the membranes were intact. The prenatal history had been entirely normal, with no bleeding at any time. The past history was noncontributory.

Physical examination revealed the fetus to be in the left occiput anterior position, the fetal heart rate was 149 per minute, and the head was in the midpelvic position. The cervix was dilated 2 cm. After an eight-hour labor, the patient was delivered with the aid of prophylactic low forceps. The infant was a vigorous, normal boy weighing 6 lb., 9 oz. Three-fourths of an hour before delivery the patient passed several dark blood clots, but there had been no bright red blood. Ten international units of pituitrin was given intramuscularly at the end of the second stage of labor. Immediately after birth there was a gush of bright red blood. The blood pressure, which had been 114/70 just before delivery, fell precipitously to 99/66. Preparations for manual exploration were made as rapidly as possible. The placenta was found to be partially separated, with a good cleavage plane under the adherent portion. It was removed manually two minutes after birth. Ergotrate, $\frac{1}{320}$ grain, was given intramuscularly, and an intravenous injection of 1,000 c.c. of 5 per cent glucose in saline solution was started. As soon as the placenta was removed the hemorrhage notably abated, continuing only as a slow continuous trickle. The uterus did not become firm in response to the ergotrate. Therefore, a Western strip soaked in isotonic saline* was used to tightly pack the uterus, after which another $\frac{1}{320}$ grain of ergotrate was given, this time intravenously. All bleeding ceased, and the uterus became firm. A Foley retention catheter was inserted. Sulfadiazine was given orally, 1 Gm. every four hours, prophylactically. The pack was removed twenty-four hours later and there was no bleeding. The uterus remained firm. The maximum temperature during the 24-hour period while packed and in the following twenty-four hours was 99.6° F. The postpartum course was not remarkable, and the patient was discharged recovered on the eighth postpartum day.

This case serves to illustrate the cardinal principles of early interference in the event of abnormal bleeding, and the benign nature of manual removal and intrauterine packing, *if the patient is in good condition when the procedure is done.* Because there was no delay, the patient did not go into shock, did not require a transfusion, and did not run a septic, or even a morbid postpartum course, and the recovery period was not prolonged.

*We have abandoned sulfonamide impregnation of uterine packs, since oral or intravenous chemotherapy is more effective than local and lends the advantage of accurate control of therapy by blood-concentration levels.

CASE 3.—(Referred to above under morbidity.) A 24-year-old gravida iii, para iv, was admitted on March 23, 1945. She was due to deliver on May 28. Past history revealed "kidney disease" dating from the first pregnancy, which ended in delivery of an eight-month stillborn infant in 1939. The subsequent three pregnancies and deliveries had been uncomplicated. There had been no recurrence of the "kidney trouble."

The prenatal history was uneventful until two months before this admission, when the patient developed intermittent dysuria and pain at the left costovertebral angle. For the two weeks preceding admission, she also had a cough, productive of green mucopurulent sputum and associated with chilly sensations, feverishness, and sweating. She had not consulted a doctor throughout the prenatal course.

On the day of admission, the patient went into labor and delivered spontaneously a 1,540 Gm. stillborn girl at home without benefit of complete aseptic technique. She was admitted to the hospital two hours after delivery because of a retained placenta. Bleeding had been present only as an intermittent trickle from the vagina; two attempts to deliver the placenta by treating the uterus by Credé's method had been made an hour after delivery.

The pertinent findings of the admission physical examination were decreased tactile fremitus at the base of both lungs and fine, moist, crepitant rales over both apices posteriorly, and bilateral tenderness at the costovertebral angle, more marked on the left. The temperature was 99.2° F., the pulse 100, and the blood pressure 92/82. The red cell count was 3,800,000, and the hemoglobin 11 Gm. The urine showed a specific gravity of 1.024 and contained no albumin, olive sugar and 2+ ketones. The sediment was leaded with white cells.

Intravenous administration of 5 per cent glucose and saline was started immediately. After thorough preparation of the patient, manual removal was done four hours after delivery. The placenta was still adherent over approximately one-third of its surface, and a good cleavage plane was present. There was a 3 cm. succenturiate lobe along the placental margin. Following removal, a small amount of bleeding persisted and a tight intrauterine pack was inserted, controlling the hemorrhage. The infusion was followed with 500 c.c. of whole blood and 1,200 c.c. of electrolyte fluids containing 2.5 Gm. of sodium sulfadiazine. Sulfadiazine was continued orally, 1.0 Gm. every four hours. The blood pressure rose to 110/70 by the time the intravenous therapy had been completed, where it remained throughout the postpartum course. The pack was removed after twenty-four hours, and repacking was not required. The maximum postpartum temperature was 101.2° F., occurring on the second postpartum day. The patient continued to run a gradually diminishing, spiking temperature for the next five days, after which it remained normal. Her condition was diagnosed by medical consultants as a recurrent bilateral pyelonephritis, complicated by a subsiding acute tracheobronchitis. X-ray examination of the chest on the third postpartum day revealed peribronchial and perihilar infiltration and stippling throughout both lower lung fields. No acid-fast organisms were found in the sputum. The cough rapidly became nonproductive and disappeared on the sixth day. Culture of the urine revealed nonhemolytic *Staphylococcus aureus* and nonhemolytic streptococcus. The white cells disappeared from the urine sediment on the fifth day, and pain and tenderness at the costovertebral angle ceased by the seventh day. Pathologic examination of the placenta showed only focal calcification. The patient was discharged recovered on the thirteenth postpartum day.

Intravenous Treatment and Chemotherapy

In the total series, 12 patients (26.7 per cent) received either transfusion or infusion (Table VI). In the three cases described above, this treatment was given for subclinical shock. In the rest, it was given prophylactically.

TABLE VI. ANALYSIS OF INDICATIONS FOR RECEIVING INTRAVENOUS THERAPY

	PROPHYLACTIC	SUBCLINICAL SHOCK	TOTALS
Infusion	5	1	6
Transfusion	4	2	6
Totals	9	3	12

TABLE VII. ANALYSIS OF CASES RECEIVING CHEMOTHERAPY

	CASES		MORTALITY	MORBIDITY	UTERINE PACKING	AVERAGE HOSPITAL DAYS	
	NO.	PER CENT				WARD	PRIVATE
No chemotherapy	23	51.1	0	0	0	7.1	9.1
Chemotherapy	22	48.9	0	1	5	9.1	10.0
Totals	45	100.0	0	1	5	8.1	9.5

Sulfonamides, usually sulfadiazine, were given prophylactically in 22 cases (48.9 per cent). Our usual dosage has been 2 Gm. for the first dose and 1 Gm. every four hours thereafter; this is varied after the first twenty-four hours according to the blood level of the drug, so as to maintain a level of 15 mg. per 100 c.c. Two grams of sodium bicarbonate were also given every four hours to alkalinize the urine. The incidence of chemotherapy was higher in the earlier cases in the series, when it was routinely given to all patients. The later cases received it only if removal was particularly difficult or if a uterovaginal pack was inserted.

Penicillin was used in only three cases (7 per cent), with equally good results. It is expected that its use will be routine in the future for the majority of our cases in which chemotherapy is indicated.

Additional Cases

Two additional cases are included because of their instructive features.

CASE 4.—A 25-year-old gravida iv, para iii was admitted to an outside hospital on Nov. 6, 1944. The prenatal course had not been remarkable.

After an uneventful labor, the patient delivered a healthy vigorous infant. The placenta was retained despite attempts to express it by suprafundic pressure. Blood loss was not marked at any time. An hour after the end of the second stage, several attempts to deliver the placenta by Credé treatment of the uterus were made, without avail. At this time there was a slight blood loss, noted as a slow continuous oozing from the vagina. There were no signs of separation of the placenta. Suddenly, during another attempt to deliver the placenta by the Credé method, the patient went into shock. All attempts to deliver the placenta were abandoned and antishock therapy was begun, this including transfusions of whole blood. In the next twenty-four hours the patient received 600 c.c. of plasma, 1,500 c.c. of whole blood, and 1,500 c.c. of isotonic saline solution, but remained in shock. Bleeding during this period was minimal except for the passage of occasional moderate-sized clots. On the second postpartum day she received 500 c.c. of whole blood and 500 c.c. of saline, after which she appeared to be in somewhat better condition, having partially rallied from shock. Forty-seven hours after delivery the placenta was expressed by suprafundic pressure, together with several large blood clots. Following delivery of the placenta, the patient's condition rapidly improved, and although the postpartum course was mildly morbid, it was not stormy. The maximum postpartum temperature was 101° F. The patient was discharged recovered thirteen days after delivery and eleven days after expulsion of the placenta.

This case amply illustrates the danger of shock from the combination of slow continuous blood loss and repeated and prolonged Credé treatment of the uterus. Failure to remove the placenta manually while the patient was still in good condition resulted in the sudden onset of shock. This precluded the possibility of manual removal and necessitated the prolonged and uncertain course of intensive antishock therapy, coupled with expectant waiting for separation of the placenta to occur, with all the attendant risks of superimposed infection and sudden profuse hemorrhage from the retained placenta.

CASE 5.—A 30-year-old gravida i, para i was admitted on Jan. 23, 1945, three days post partum. She had been delivered at an outside hospital of an 11 lb., 8 oz. normal, vigorous infant with the aid of low forceps and mediolateral episiotomy. Despite the large size of the baby, labor had not been difficult, lasting only six hours. Following delivery, the placenta was retained despite suprafundic pressure, followed by heroic Credé treatment of the uterus, which resulted in large ecchymoses of the abdominal wall. There was no vaginal bleeding, and only two small blood clots were passed in the three-day period before admission. A prophylactic course of sulfadiazine, in full therapeutic amounts, had been given at once. The past history was not remarkable.

Physical examination on admission was not remarkable except for ecchymoses of the abdominal wall and an enlarged uterus rising to the costal margin slightly to the right of the midline. The uterus was firm, slightly tender, and symmetrical. The temperature was 101.4° F. and the pulse 114. The urine was normal. The red cell count was 3,340,000; the hemoglobin, 9 Gm.; and the white cell count, 13,850, with 89 per cent polymorphonuclears. The total protein was 4.89 Gm. and the nonprotein nitrogen 24 mg. per 100 c.c.

The patient was obviously in no condition at this time to undergo any operative procedure, and all efforts were directed toward improving her general condition and the prevention of more serious infection. This required 5 days, during which time the patient received 1,500 c.c. of whole blood, 20,000 units of penicillin every three hours intramuscularly, and a high-protein diet. Pituitrin was also given in four courses, each course being composed of four doses at hourly intervals of 10 I.U. intramuscularly. Small necrotic fragments of tissue were passed on several occasions, being identified microscopically as placental tissue. The maximum temperature was 101.8° F., occurring on the day of admission; the remainder of the time it ran an irregular, spiking course between normal and 100.6° F. The urine was normal and blood cultures were negative.

Five days after admission and eight days after delivery, the fundus was at the level of the umbilicus, still slightly to the right of the midline, and there was a foul lochia. The temperature was 98.8° F., the pulse 96, and the blood pressure 118/78. The anemia and leucocytosis were essentially unchanged; the total protein concentration had risen to only 5.05 Gm. per 100 c.c. It was thought that to wait longer held little hope for improvement. Although hysterectomy is the usual procedure of choice in such circumstances, it might well have proved disastrous, owing to the patient's poor general condition. It was therefore elected to attempt manual removal, followed by hysterectomy if absolutely necessary.

On vaginal examination (the first that had been performed), under double setup precautions, a large intramural leiomyoma was felt in the lower uterine segment on the left. It was approximately 10 cm. in diameter and caused much difficulty in entering the uterine cavity. The placenta was found on the left lateral uterine wall and fundus. It was manually scraped off piecemeal with much difficulty, owing to the marked placental necrosis and the obstruction offered by the leiomyoma, making the placental site most difficult to reach. There

was no appreciable bleeding at any time. The patient withstood the operation well, and the subsequent course, although morbid, was one of rapid recovery. The maximum postoperative temperature was 101.6° F., occurring on the third day, after which time it remained normal. The fundus descended to three fingerbreadths above the symphysis. The lochia was at first profuse and contained small fragments of necrotic placental tissue. The patient was discharged recovered on the twentieth postpartum day, twelve days postoperatively. She was followed by her local doctor but was seen by us twelve weeks post partum. During this period she had passed small fragments of necrotic tissue on two occasions without bleeding. At this time the uterus was only slightly larger than normal and the leiomyoma had shrunk to approximately 3 cm. in diameter.

Pathologic examination of the main portion of the placenta, as well as the fragments, revealed only focal calcification and infarction.

This case also illustrates the dangers attending too conservative an attitude toward manual removal. Had it been done early, the presence of the leiomyoma would have been much less of a handicap, owing to the then widely dilated cervix; the subsequent infection and generally poor condition of the patient would have been avoided; and the risk of sudden severe hemorrhage, always present while a placenta is retained, as well as the danger of a serious puerperal sepsis could have been prevented.

Comment

The purpose of this paper is to make an ardent plea for earlier manual removal of the placenta while the patient is still in good condition to withstand the procedure. It is our impression that recent authors, although advocating earlier manual removals, still tend to procrastinate during the vital period for optimal removal. This is due to the too rigid interpretation of the indications for removal.

This series has amply demonstrated the relatively benign nature of the procedure per se. In our minds, the former morbidity and mortality associated with manual removal arises, not from the procedure, but from the usually associated excessive blood loss, the presence of definite shock with or without blood loss, and delays in removal, allowing supervening infection to begin. It has been pointed out that no definite quantity of blood loss should be relied on as an indication for manual removal, since the tolerance to blood loss is extremely variable, depending on many other factors, such as the length and exhaustiveness of labor, the suddenness with which the blood is lost, and the general stamina of the patient. Consequently, any steady flow of blood should serve as a warning that manual removal should be considered. Delay may waste the precious minutes during which this is possible, leading to consequences similar to those encountered in the additional cases described, as the unavoidable price of wishful thinking.

Since our technique is not unlike that generally used for manual removals, and since this series includes cases treated not only by visiting staff but by the house staff as well, the only logical cause for the improvement in mortality and morbidity in this series seems to be the radical changes in indications for the procedure that we have adopted.

Summary

Forty-five consecutive cases of manual removal of the placenta are reviewed.

All cases were delivered within the last two years, thus receiving the advantage of a unified policy of treatment.

The mortality was zero. The morbidity was 2.2 per cent, corrected to zero.

The technique of removal is not different from that used elsewhere.

The marked improvement in results, especially the lowering of morbidity, is attributed to the relatively better condition of the patient when the procedure is performed, which in turn arises from the radically liberal indications used for removal.

The benign nature of manual removal per se as a procedure is borne out by our results.

That complications arise from unwarranted delay is brought out by other current series in which early removal is endorsed but not fully enforced. Two additional cases are described to emphasize this point.

Since early manual removal performed on a patient in good condition is a benign procedure, radical liberalizing of the indications for it is in order.

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THE RELATIONSHIP OF MATERNAL WEIGHT GAIN TO THE WEIGHT OF THE NEWBORN INFANT

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MOST physicians who supervise prenatal care caution their patients against excessive weight gain during pregnancy. Their reasons for doing so are multiple. It is the opinion of many that the size of the fetus may thus be controlled. Prevention of overgrowth of the baby, especially in the presence of a pelvic contracture, would reduce the incidence of disproportion with its attendant hazards.

Numerous contributions have been made to the literature concerning the relation of the maternal weight gain during pregnancy to the weight of newborn infants. Here, as in many subjects, controversial opinions have resulted from each author's analysis of his statistics. Davis,[1] Slemons and Fagan,[2] Bingham,[3] and Hanley[4] conclude that the birth weight of the newborn is proportionate to the maternal weight gain during pregnancy. Beilly and Kurland,[5] on the basis of a comprehensive mathematical survey of 979 cases, assert that a low, nevertheless significant, degree of correlation exists between the weight gain of the mother and the weight of the baby at birth. McIlroy and Rodway[6] aver that the infant's birth weight apparently is not directly dependent upon the maternal increase in weight. Chesley[7] clearly demonstrated the conflicting results encountered in a summary of 11,960 cases analyzed in the literature. In eight papers (5,799 cases), no significant difference had been observed between the weight gain of primiparas and multiparas; another eight (1,249 cases) found a greater gain in multiparas, whereas five (1,418 cases) found the reverse to be true. He stated that where differences are found, they are usually not very great, and probably not truly significant.

In the face of the many conflicting observations, a statistical analysis of a moderately large series of cases is warranted to throw further light on the relationship, if any, of maternal weight gain to the weight of the newborn infant.

Material

During his tenure as Chief of the Obstetrics and Gynecology Section of a military hospital from May 20, 1944, to Nov. 29, 1945, the writer delivered 605 women of 610 babies. For the purpose of comparing the statistics covering these patients with those of other authors, 567 cases were selected for this survey based upon the following criteria:

1. Single pregnancies in which the patient began antepartum care prior to the twelfth week of gestation and was observed at regular intervals until term. In those instances in which patients transferred to this

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Clinic at a later period in pregnancy, antepartum records were obtained from the former physicians, thereby providing a complete record.

2. Onset of labor was spontaneous with delivery of a normal living infant.

3. With the exception of two well-compensated rheumatic cardiacs, the parturients had had no pre-existing disease.

The following cases were excluded from the survey for failing to meet the aforementioned criteria:

1.	Prematurity	18
2.	Elective cesarean section	5
3.	Multiple pregnancy	5
4.	Inadequate prenatal care	3
5.	Stillbirths	3 (2 monstrosities)
6.	Toxemia of pregnancy	2
7.	Hodgkin's disease	1
8.	Hemorrhagic disease of newborn	1
	Total	38 cases

All patients were advised to partake of a well-balanced diet. However, each case was individualized. The obviously underweight were encouraged to increase the caloric intake to fortify themselves against the vicissitudes of pregnancy, parturition, and the puerperium. Those who presented evidence of being overweight or who were gaining weight too rapidly were admonished concerning dietary indiscretions. Most patients in this category adhered to the recommended diets. A few, however, were unable to resist gastronomic temptation.

TABLE I. MATERNAL WEIGHT GAIN AND WEIGHT OF NEWBORNS

MATERNAL WEIGHT GAIN IN LBS.*	NO. OF BABIES	PER CENT OF TOTAL	MATERNAL WEIGHT GAIN AVERAGE LBS.	AVERAGE WEIGHT NEWBORN LBS.	AVERAGE WEIGHT NEWBORN OZ.	NO. OF MALES	AVERAGE WEIGHT OF MALES LBS.	AVERAGE WEIGHT OF MALES OZ.	NO. OF FEMALES	AVERAGE WEIGHT FEMALES LBS.	AVERAGE WEIGHT FEMALES OZ.
0- 5	4	0.71	1.63	6	6.5	2	6	8.5	2	6	4.75
5-10	30	5.29	7.68	7	2.75	14	7	4.5	16	7	1.0
10-15	65	11.46	12.75	7	0.75	36	7	2.0	29	6	15.25
15-20	141	24.87	17.25	7	4.0	66	7	5.5	75	7	2.75
20-25	170	29.98	22.04	7	7.0	92	7	10.0	78	7	3.75
25-30	92	16.22	27.12	7	10.25	35	7	12.5	57	7	9.0
30-35	45	7.94	31.74	7	10.25	20	7	11.5	25	7	9.5
35-40	14	2.47	36.93	7	9.0	12	7	11.5	2	6	9.0
40-50	6	1.06	42.63	7	9.0	5	7	13.0	1	6	5.5
Entire series	567	100.00	21.05	7	6.0	282	7	8.5	285	7	4.0

*0 lbs. up to but not including 5 lbs., etc.

Observations and Deductions

I. *Maternal Weight Gain and Weight of Newborns.*—Table I is a presentation of the distribution of cases according to maternal weight gains in groups of 5 pounds ranging from 0 to 50 pounds, following the outline of Beilly and Kurland.[5] Each group tabulates the number of babies, percentage of the total, average maternal weight gain, average weight of newborn, distribution as to sex, and average birth weight of each sex.

Although the table indicates a tendency for the average weight of the newborn to increase as the mother gains more weight during gestation, it conclusively demonstrates that there is *no* proportionate relationship between the two. The evidence upon which this statement is based is as follows:

1. The mothers of the 10- to 15-pound group gained an average of 5.07 pounds more than the mothers in the preceding group, but the average birth weight of their babies was 2 ounces less than that of the babies in the smaller weight-gain group.

2. The average maternal weight gain of the 15- to 20-pound group exceeded that of the 5- to 10-pound group by 9.57 pounds. This increase in maternal weight gain was accompanied by a difference of only 1.25 ounces in the average birth weight of newborns of the respective groups. Comparison between the 15- to 20-pound and 10- to 15-pound groups reveals an increase of 4.5 pounds in the average maternal weight gain associated with a difference of 3.75 ounces in the average birth weights of the babies. In this instance, therefore, an increase in the average maternal weight gain which was one-half that noted in the preceding observations was associated with a difference in average birth weight which was three times as great.

3. The average birth weight of the babies in the 25- to 30-pound and 30- to 35-pound groups was the same, although a difference of 4.62 pounds existed between the average maternal weight gains of these groups. The babies averaged 3.25 ounces more at birth than those of the 20- to 25-pound maternal weight-gain group despite increases in the average maternal weight gain of 5.08 pounds and 9.7 pounds respectively.

4. The average birth weight of the babies of the 35- to 40-pound and 40- to 50-pound groups was identical. The average weight of the newborns of these groups was 1.25 ounces and 2.0 ounces less, respectively, as compared with that of the progeny of mothers of the two preceding groups. However, the increases in the average maternal weight gain had been marked.

Beilly and Kurland[5] concluded from their observations that there is a progression in the increase of the average weights of the newborns. They observed that with the exception of the 26 cases of the group where the mother had gained from 5 to 10 pounds, the average weight of the newborns paralleled the maternal weight gain. The statistics of the current series fail to substantiate this observation.

TABLE II. AVERAGE MATERNAL WEIGHT GAIN AND AVERAGE BIRTH WEIGHT

AUTHOR	NO. OF CASES	AVERAGE MATERNAL WEIGHT GAIN (LBS.)	AVERAGE WEIGHT NEWBORN	
			LBS.	OZ.
Davis[1]	150	21.00	7	4.5
Slemons and Fagan[2]	500	16.50	7	4.0
Hanley[4]	482	21.50	7	6.0
Beilly and Kurland[5]	979	22.28	7	3.0
Hannah[8]	236	13.20	7	13.0
Klein	567	21.05	7	6.0

Table II demonstrates the marked variations in the average maternal weight gain and the average weight of the newborn as determined by the individual authors.

These statistics suggest further evidence against the existence of a direct correlation between the average maternal weight gain and the average weight of the newborn. In the series in which the average maternal weight gain was the greatest (22.28 lbs.), the average weight of the newborn was the least (7 lbs., 3 oz.). The average weight of the newborn was greatest (7 lbs., 13 oz.) in the presence of the least average maternal weight gain (13.2 lbs.).

II. *Relationship of Weight of Newborn to a Maternal Weight Gain of 20 Pounds.*—In discussing the subject of the relationship of the weight of the newborn to the maternal weight gain, some authors prefer to group their cases into categories based upon a maternal weight gain which is either less than or exceeds 20 pounds. Toombs[9] further subdivided these groups by introducing the factor of a 7-pound average weight of the baby. In Table III, a comparison is made between his findings and those of the current series.

TABLE III. RELATION OF WEIGHT OF NEWBORN AND 20-POUND MATERNAL WEIGHT GAIN

AUTHOR	TOTAL CASES	MATERNAL WEIGHT GAIN							
		20 LBS. OR MORE				LESS THAN 20 LBS.			
		BIRTH WEIGHT				BIRTH WEIGHT			
		(A) 7 LBS. OR MORE		(B) LESS THAN 7 LBS.		(C) 7 LBS. OR MORE		(D) LESS THAN 7 LBS.	
		CASES	PER CENT	CASES	PER CENT	CASES	PER CENT	CASES	PER CENT
Toombs	250	74	29.6	31	12.4	98	39.2	47	18.8
Klein	567	244	43.03	83	14.64	140	24.69	100	17.64

An analysis of Toombs' statistics discloses that, although 58 per cent of his patients had gained less than 20 pounds during pregnancy as compared with 42 per cent having gained 20 or more pounds, 68.8 per cent of the babies had weighed 7 or more pounds at birth. In the current series, 57.67 per cent of the mothers had gained 20 or more pounds (average 25.76 lbs.) as compared with 42.33 per cent whose weight gain had been less than 20 pounds (average 14.56 lbs.); 67.72 per cent of the babies weighed 7 pounds or more at birth (average 7 lbs., 14 oz.), whereas 32.28 per cent weighed less than 7 pounds (average 6 lbs., 4 oz.). The average weight gain of the 327 mothers who had gained 20 or more pounds was 25.76 lbs. The average weight of their offspring was 7 pounds, 8.25 ounces. The 240 mothers whose weight gain had been less than 20 pounds (average 14.56 lbs.) produced infants who averaged 7 pounds, 2.5 ounces at birth. Therefore, a difference of 11.2 pounds in the average maternal weight gain was associated with a difference of only 5.75 ounces in the average weight of the newborns.

Statistical investigation of the cases which comprise this series presents additional evidence against the existence of a direct correlation between the maternal weight gain during pregnancy and the weight of the newborn:

1. The average maternal weight gain of the cases in group (b) in Table III (25.88 lbs.) exceeded that of group (a) (25.64 lbs.) by 0.24 pounds. However, there was a difference of 1 pound, 10.5 ounces in the average weight of the newborns of the respective groups—(a), 7 lbs., 15 oz.; (b), 6 lbs., 4.5 oz.

2. The average weight gain of the mothers in group (c) (15.02 lbs.) was greater by 1.09 pounds than that of the mothers in group (d) (13.93 lbs.). The average birth weights of the babies of these groups differed by 1 pound, 9.25 ounces—(c), 7 lbs., 13 oz.; (d), 6 lbs., 3.75 oz.

3. The average weight gain for the group in which the mothers gained 20 or more pounds and whose babies weighed 7 or more pounds at birth was 25.64 pounds. The average weight of the babies in this group was 7 pounds and 15 ounces. The mothers whose weight gain had been less than 20 pounds and whose babies' birth weights averaged 7 or more pounds had gained an average of 15.02 pounds. The average birth weight of the babies of this group (7 lbs., 13 oz.) was only 2.0 ounces less than that of the preceding group, despite a difference of 10.62 pounds in the average maternal weight gain.

4. Concerning the babies whose average birth weight was under 7 pounds, a difference of 11.95 pounds in the average maternal weight gain—(b), 25.88

lbs.; (d), 13.93 lbs.—was associated with a difference of only 0.75 oz. in the average weights of the newborns—(b), 6 lbs., 4.5 oz.—(d), 6 lbs., 3.75 oz.

On the basis of these observations, it is difficult to accept the premise of Beilly and Kurland[5] that every one pound gain of the mother is accompanied by a 0.25 pound increase in the birth weight of the baby.

III. *Relation of Parity to Maternal Weight Gain and Weight of the Newborn.*—The statement was made in the introduction to this discussion that many controversial opinions have resulted from each author's analysis of his observations. This fact is emphasized when an attempt is made to establish a relationship between parity, the maternal weight gain during pregnancy, and the weight of the newborn. Bingham[3] determined that the average birth weight of babies of multiparas was 7 pounds, 6 ounces, whereas that of the babies borne by primiparas was 7 pounds, 3 ounces. Hannah[8] and Hanley[4] ascertained that primiparous mothers gained more weight during pregnancy than multiparas, but the reverse was true in regard to the birth weight of their respective progeny. Cummings[10] noted that primiparas averaged a greater weight gain than multiparas. McIlroy and Rodway[6] stated that "in primiparas an apparent correlation existed between the maternal weight gain and the birth weight of the infant, the latter being of greater weight as the maternal weight increased." Their results show that the maternal weight gain and the birth weight of the babies of multiparas exceeded that of primiparas. Siddall and Mack[11] and Bray[12] concluded that parity has little, if any, effect upon weight gain. The observations of the series under discussion are tabulated in Table IV.

TABLE IV. RELATION OF PARITY, MATERNAL WEIGHT GAIN, AND WEIGHT OF NEWBORNS

MATERNAL WEIGHT GAIN IN LBS.*	PRIMIPARA					MULTIPARA				
	NO. OF BABIES	PER CENT OF TOTAL	MATERNAL WEIGHT GAIN AVERAGE LBS.	AVERAGE WEIGHT OF NEWBORN LBS.	OZ.	NO. OF BABIES	PER CENT OF TOTAL	MATERNAL WEIGHT GAIN AVERAGE LBS.	AVERAGE WEIGHT OF NEWBORN LBS.	OZ.
0- 5	3	0.53	1.75	6	4.5	1	0.18	1.25	6	13.0
5-10	25	4.41	7.84	7	3.5	5	0.88	6.85	6	14.0
10-15	45	7.94	12.84	7	1.75	20	3.53	12.55	6	14.75
15-20	111	19.58	17.29	7	3.25	30	5.29	17.03	7	7.0
20-25	121	21.33	22.03	7	6.5	49	8.64	22.07	7	8.75
25-30	60	10.58	27.21	7	8.0	32	5.64	26.91	7	13.0
30-35	30	5.29	31.44	7	8.5	15	2.64	32.33	7	14.0
35-40	9	1.59	36.56	7	6.5	5	0.88	37.60	7	13.75
40-50	4	0.71	43.06	7	8.25	2	0.36	41.75	7	11.0
Total	408	71.96	20.69	7	5.0	159	28.04	21.99	7	8.5

*0 lbs. up to but not including 5 lbs., etc.

The 200 male newborns of primiparas averaged 7 pounds, 7.5 ounces as compared with an average weight of 7 pounds, 2.5 ounces for the 208 females. In the multiparous group, the average birth weight for the 82 males was 7 pounds, 9.5 ounces as compared with an average weight of 7 pounds, 7.5 ounces for the 77 females.

Although this table discloses that the average maternal weight gain and the average weight of the newborns of multiparas were greater than those of primiparas, the writer agrees with those authors who believe that where differences are found, they are usually not very great, and probably are not truly significant.[7, 11, 12]

IV. *Relation of Sex of Newborn and Birth Weight.*—Throughout this discussion, most results obtained have conflicted with those of other investigators. However, one respect in which the findings of this survey are in accord with the

TABLE V. AVERAGE WEIGHT OF NEWBORN ACCORDING TO SEX

AUTHOR	NO. OF CASES	AVERAGE WEIGHT MALE LBS.	AVERAGE WEIGHT MALE OZ.	AVERAGE WEIGHT FEMALE LBS.	AVERAGE WEIGHT FEMALE OZ.
McIlroy and Rodway[6]	1,000	7	5	7	2
Beilly and Kurland[5]	979	7	5	7	0
Hanley[4]	482	7	10	7	3
Hannah[8]	236	7	15	7	6
Klein	567	7	8.5	7	4

results recorded in the literature is that the average weight of male newborns exceeds that of females. The results of this survey and the findings in other large series of cases are tabulated in Table V.

V. *Relation of Age to Maternal Weight Gain and Weight of Newborn.*—One of the purposes in reviewing the current series was to ascertain whether any relationship existed between the age of the mother, her gain during pregnancy, and the weight of her baby at birth. From the results tabulated in Table VI, the conclusion is drawn that there is no correlation between these factors. The older women apparently had gained the least weight but had had the heavier babies. The youngest mothers of the series were 16 years of age (two cases); the oldest were 37 years of age (two cases); 64.9 per cent of the mothers were less than 25 years old.

TABLE VI. RELATION OF AGE TO MATERNAL WEIGHT GAIN AND WEIGHT OF NEWBORN

AGE	NO. OF CASES	PER CENT OF TOTAL	AVERAGE AGE (YEARS)	MATERNAL WEIGHT GAIN AVERAGE LBS.	AVERAGE WEIGHT NEWBORN LBS.	AVERAGE WEIGHT NEWBORN OZ.
15-19	55	9.70	18.30	20.5	7	4.5
20-24	313	55.20	22.00	21.6	7	5.75
25-29	146	25.75	26.60	25.4	7	5.75
30-34	46	8.11	31.90	20.5	7	9.5
35-40	7	1.24	36.00	19.2	7	6.0
Total	567	100.00	24.03	21.05	7	6.0

TABLE VII. DISTRIBUTION OF CASES ACCORDING TO WEIGHT OF NEWBORN

WEIGHT OF NEWBORN (POUNDS)*	NO. OF BABIES	PER CENT OF TOTAL	AVERAGE WEIGHT OF NEWBORN LBS.	AVERAGE WEIGHT OF NEWBORN OZ.	MATERNAL WEIGHT GAIN AVERAGE LBS.	NO. OF PRIMIPARAS	NO. OF MULTIPARAS	NO. OF MALE	NO. OF FEMALE
5.0- 5.5	10	1.76	5	6.5	16.43	8	2	5	5
5.5- 6.0	27	4.76	5	11.8	18.11	21	6	9	18
6.0- 6.5	66	11.69	6	3.2	19.49	54	12	33	33
6.5- 7.0	80	14.11	6	11.8	20.00	55	25	35	45
7.0- 7.5	131	23.10	7	3.8	21.19	92	39	59	72
7.5- 8.0	98	17.28	7	11.75	22.33	74	24	46	52
8.0- 8.5	89	15.70	8	3.4	22.00	64	25	50	39
8.5- 9.0	45	7.94	8	11.4	22.11	30	15	31	14
9.0- 9.5	13	2.29	9	5.9	27.21	7	6	9	4
9.5-10.0	3	0.53	9	9.5	22.58	2	1	2	1
10.0-10.5	5	0.88	10	5.5	26.50	1	4	3	2
Entire series	567	100.00	7	6.0	21.05	408	159	282	285

*5 lbs. up to but not including 5.5 lbs., etc.

Table VII represents the distribution of the cases of this series based upon 0.5 pound increases in the weight of the newborn. The average weight of the newborns, the number and the percentage of the babies in each group, the aver-

age maternal weight gain, parity, and the distribution according to sex are tabulated. Here, too, there is no evidence of a direct correlation between the weight of the newborn and the maternal weight gain during pregnancy.

Summary and Conclusions

A series of 567 cases was studied statistically to determine whether any relationship existed between the maternal weight gain and the weight of the newborns. In this group of cases, 408 primiparas and 159 multiparas were delivered of 282 male and 285 female infants. The heaviest baby weighed 10 lbs., 7.25 oz. at birth; the lightest, 5 lbs., 4.5 oz. One mother who had lost 3.25 pounds during pregnancy gave birth to a 5 lb., 14 oz. girl. The patient who had gained the most weight, 48.25 pounds, was delivered of a 6 lb., 5.5 oz. female. The average maternal weight gain for the series was 21.05 pounds, with an average weight of 7 pounds, 6 ounces for the newborns.

Analysis of the statistics yields the following conclusions:

1. There is no correlation between the maternal weight gain during pregnancy and the weight of the baby at birth.

2. The average birth weight of males exceeds that of females.

3. There is no relationship between the age of the mother, her weight gain during pregnancy, and the weight of the newborn infant.

4. Although the average maternal weight gain and the average weight of newborns of multiparas were greater than those of primiparas, the differences were slight and of no significance.

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ADENOMYOSIS OF THE UTERUS

A Study of 52 Reported Cases and a Review of the Literature

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A SERIES of 52 cases of adenomyosis uteri is presented in which the endometrium has been carefully studied. The preponderance of the anovulatory endometrium in this series (72 per cent) seems to indicate a definite association with this disease.

Despite a rather large volume of literature upon this subject, no definite general conclusions have been reached. Hofbauer[30] assumes the constant association of endometrial hyperplasia with adenomyosis uteri. Dreyfuss,[33] on the other hand, believes the endometrium exhibits a normal picture corresponding to the phase of the menstrual cycle in cases of adenomyosis uteri.

It is now generally accepted that the endometrium reflects the state of the ovary. The postmenstrual phase of the endometrium with its straight, tubular, nonsecreting glands is associated with follicular development. The early interval phase with slightly tortuous, nonsecretory glands, is associated with the well-developed follicle such as occurs immediately before ovulation. The late interval phase with moderately tortuous glands and epithelium with basal globules apparently indicates the presence of a young corpus luteum. The premenstrual phase with corkscrew glands and ragged epithelium accompanies the well-developed corpus luteum.

In probably 80 per cent of functional bleeding cases, either an interval nonsecretory endometrium, or endometrial hyperplasia ("swiss-cheese," cystic, nonsecretory endometrium) is assumed to be related to the lack of ovulation and the presence of follicular cysts in the ovaries.

It is rather generally accepted at the present time that endometrial hyperplasia indicates hyperestrinism. However, this point is still somewhat controversial.

In view of the fact that direct hormone titers are very difficult to determine and subject to many errors, endometrial findings are probably of more value, at the present time, in the study of abnormalities of ovarian secretion. In this series, the endometrial findings are classified, and the endocrine mechanisms are interpreted on this basis.

Historical

The work of Cullen,[1] in 1897, appears to be the earliest reference to adenomyosis in the English literature. He describes three cases and refers to earlier works of Von Recklinghausen and Dersterweig in the German literature. In a later paper, Cullen[3] mentions Von Rokitansky, who first described adenomyosis as a clinical entity in 1860. In 1902 Baldy and Longcope[2] reported two cases

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of adenomyosis uteri. In 1922, adenomyosis uteri was still considered enough of a rarity to report single cases as Abell[6] and Frank[7] did. Robins[8] reported two cases in 1923.

In the space of the last twenty years interest in the subject has grown tremendously, as indicated by an increasing number of papers.

Incidence

Cullen,[3] McCarty and Blackman,[4] Westmann,[5] Light,[32] and Crossen and Crossen[34] found adenomyosis uteri in 5 per cent, 6.43 per cent, 8 per cent, 14 per cent and 5-6 per cent, respectively, of extirpated myomatous uteri. Frankl found internal adenomyosis (adenomyoma uteri) in 1/12 and Dougal[24] in 1/17 of their cases of fibromyomas.

On the other hand, Kanter, Klawans, and Bauer[21] found adenomyosis uteri in 52 per cent of 100 cases of myomatous uteri.

In reports on the incidence of uterine adenomyosis in all types of endometriosis, figures vary widely. Van S. Smith[13] found it to be 34 per cent; L. L. Hill,[15] 15 per cent; Cattell and Swinton,[22] 21 per cent; F. A. Pemberton,[25] 11 per cent; Counsellor[27] 69.9 per cent and F. L. Payne,[35] 6.5 per cent.

Shaw[12] reported at least slight adenomyosis uteri in all cases of endometrial hyperplasia, but Novak and Martzloff[10] found adenomyosis uteri in only 25 per cent of their cases of endometrial hyperplasia.

Meyer and Kitai found that a moderate degree of adenomyosis uteri was almost the rule in women approaching the climacteric.

Dreyfuss[33] found adenomyosis uteri present in 8.1 per cent of 1,870 uteri extirpated because of any lesion.

The difference in the incidence of adenomyosis as reported by various workers may be accounted for by the fact that slight "dipping down" of the endometrium into the myometrium is called adenomyosis by some, but ignored by others.

In this series, all cases of adenomyosis uteri were characterized by a marked downgrowth of endometrium in the muscular layer.

Age Incidence

The works of Cullen,[3] Westmann,[5] Jeffcoate and Potter,[16] Rockstroh,[20] Skamnakis,[28] T. C. Moss,[31] Dreyfuss,[33] Fallas and Rosenblum,[36] and Frankl[37] all agree that by far the greatest number of cases of adenomyosis uteri occur in the fifth decade. (Table I).

TABLE I. PRESENT SERIES*

Age	21-30	31-40	41-50	51-60	61 and up
No. of Cases	3	18	22	6	1
Percentage	6	36	44	12	2

*Age range, 25-61 years; average age 42; age unknown in two cases.

In connection with the age incidence, it is interesting to note that Dreyfuss found the average age of his cases of adenomyosis uteri to be 46 years, while that of endometriosis was 33 years. This difference seemed to indicate to him different origins of adenomyosis and endometriosis.

The youngest case found is that of Holden[14] in a girl 14 years old, whose symptoms began six months after the onset of menstruation, and consisted of a severe dysmenorrhea. The adenomyotic tissue was within a definite fibroid, having no connection with the lining of the uterus.

This case would argue against those who believe, as does Dreyfuss[33] that repeated childbirths or abortions play a role in the genesis of adenomyosis.

Symptoms

The symptoms of adenomyosis, per se, are very difficult to ascertain, because this lesion is so often associated with other pelvic pathology which may cause similar complaints.

Most writers agree that excessive irregular bleeding is the most common complaint; dysmenorrhea is much less frequent in adenomyosis uteri (Jeffcoate and Potter[16] and Dreyfuss[33]). In fact, Frankl found dysmenorrhea to be rare in adenomyosis uteri.

In the present series, patients complained of metromenorrhagia in 56 per cent of the cases. Dysmenorrhea was present in 29 per cent of the cases. Both together were present in 17 per cent of cases. Backache occurred in 3 per cent of cases.

In no case in this series was adenomyosis uteri present alone, therefore no definite conclusions can be drawn as to the symptoms of this condition itself.

Endometrial Findings

The state of the endometrium in adenomyosis uteri is still a controversial point. Jeffcoate and Potter[16] found that endometrial hyperplasia occurred in 54.5 per cent of cases of adenomyosis and that the "interval phase" of the endometrium was a constant finding. Whether by "interval" they meant "early interval nonsecretory" is unknown. Frankl[11] found hyperplasia in 36.7 per cent of cases of adenomyosis uteri; Shaw,[12] in 100 per cent; Rockstroh,[20] in 17.4 per cent; Skamnakis,[28] in 13.2 per cent; and Dreyfuss,[33] in 13 per cent.

The difference between the various reports may be explained by the work of Burch, Phelps, and Wolfe[17] who find that where the specimens have been obtained after a long period of bleeding, one finds an early interval nonsecretory endometrium. This is hyperplastic in the sense that the endometrium is in the early interval phase, but should be in the secretory phase as determined by the last menstrual period. While these specimens do not exhibit the advanced morphologic changes of hyperplasia, clinical and experimental facts indicate that the changes shown are different forms of the same process and are to be classified with hyperplasia. If the interval nonsecretory endometrium occurring in what should be the premenstrual phase were classified with the hyperplastic endometrium, a much more common association of this condition with adenomyosis uteri might be found.

In the present series, the uterine endometrium was studied in 50 cases of adenomyosis uteri. Endometrial hyperplasia was present in 19 cases (typical swiss-cheese, nonsecretory endometrium). Early interval nonsecretory endometrium was present in 19 cases. In 12 of the latter cases, the endometrium, as reckoned from the last menstrual period, should have been in the secretory phase. In five cases, no last menstrual period was recognized or recorded. These cases are not included in the percentage tabulation, as their significance is unknown. In two cases, the nonsecretory endometrium was in the proper phase of the cycle, so that they were not necessarily significant and were, therefore, not included, either.

Thus, in 43 cases of adenomyosis uteri, there were three cases of senile endometrium, one case of "mixed endometrium," and eight cases of secretory endometrium.

The anovulatory cycle then was present in 31 cases, or 72 per cent. The anovulatory cycle (including endometrial hyperplasia and the sustained early nonsecretory endometrium) is accepted by most men as indicative of hyperestrinism (Jeffcoate and Potter[16]). Its occurrence in such large percentage may indicate that a causal relationship is present, or that both hyperplasia and adenomyoma have an identical etiologic factor.

Most writers mention the fact that the age incidence of endometrial hyperplasia and adenomyosis uteri parallel each other. Both these conditions are most common in the fifth decade.

This relationship is further indicated by the similar incidence of adenomyosis uteri and endometrial hyperplasia in two series of myomatous extirpated uteri. F. W. Light,[32] in 100 myomatous uteri, found 13 had adenomyosis uteri and 17 had endometrial hyperplasia. Kanter, Klawans, and Bauer,[21] in 100 cases of myomatous uteri, observed 52 cases of adenomyosis uteri and 53 hyperplastic endometria. Neither of these papers mention how many patients had both of these conditions, so this data is not as significant as it might be. At any rate, a strikingly similar incidence of adenomyosis and endometrial hyperplasia is seen in both these series.

TABLE II.

	NO. OF CASES	NO. OF CASES OF HYPERPLASIA	NO. OF CASES OF EARLY INTERVAL ENDOMETRIUM	AVERAGE AGE
Group I	19	12	7	45 years
Group II	18	7	11	41.5 years

The present series of cases was studied in two groups, and the differences shown in Table II were noted in the course of the study. The table represents 38 cases in which hyperplasia or interval, nonsecretory endometrium was present. In one case the age was unknown.

The larger number of hyperplastic endometria in the older group and smaller number in the younger group led to further study of this situation. It was then found that the average age of the 19 cases with endometrial hyperplasia was 44 years, while the average age of those with an early interval nonsecretory endometrium was 37 years. This difference seems to indicate that the early interval nonsecretory endometrium is an early stage in the development of endometrial hyperplasia.

In the eight cases with secretory endometrium, the average age was 34.9 years, or almost seven years less than that for the whole series. It is possible that the process leading to endometrial hyperplasia has not been of sufficient duration to upset the menstrual cycle in these cases.

An interesting finding in one case was a mixed endometrium (secretory plus swiss-cheese, cystic hyperplasia). This patient was the only one in the entire series in whose ovary an active corpus luteum was seen. She complained of severe dysmenorrhea, but not of irregular bleeding. Her last menstrual period began sixteen days before operation.

Wilson and Kurzrok,[26] in an interesting discussion of the mixed endometrium, concluded that the most likely explanation of this phenomeon is excessive production of estrogenic hormone during the follicular portion of the cycle, producing a cystic endometrium to which secretory effects are added during the luteal phase of the cycle. Moreover, they produced a mixed endometrium in a woman with normal menses by prolonging and intensifying the follicular phase by means of estrogenic hormone. This is a peculiar and less common reaction than the purely hyperplastic endometrium, and its full significance is still unknown.

Role of Hyperestrinism

Jeffcoate and Potter[16] conclude that an overproduction of estrin by the ovary is the most important factor in the development of endometriomas at any site.

DeSnoo[18] feels that hyperfunction of the ovary causes adenomyosis and endometrial hyperplasia.

Witherspoon[19] says that fibroids, endometrial hyperplasia, and endometriomas are all due to excessive ovarian follicular hormone.

Moss,[31] on the other hand, concludes that hyperplasia of the uterine mucosa accompanies a large percentage of cases of endometriosis, particularly adenomyosis but that the hyperplastic endometrium in these cases differ from the usual picture found in excess secretion of folliculin.

Kanter, Klawans, and Bauer[21] feel that hyperestrinism plays a part in fibromyomas, adenomyosis, and endometrial hyperplasia, but that it is not the sole factor.

Sherwood[29] concludes that estrin is the activating principle in all endometriomas.

Light[32] concludes that endometrial hyperplasia, fibroids, and adenomyosis have a common etiologic factor, but that other factors must participate.

Henderson[38] feels that a disturbance in estrin production may be of etiologic significance in the production of adenomyosis uteri.

It is my opinion, from reviewing the literature and the present series of cases, that hyperestrinism, must often with absence of corpus luteum hormone, is a common factor, and probably an important one in endometrial hyperplasia and adenomyosis uteri. It is difficult to decide, however, whether a causal relationship is present.

Incidence of Fibromyomas in Cases of Adenomyosis Uteri

Cullen,[1] in 1897, found that of three cases of adenomyosis, all had fibromyomas (100 per cent); Novak and Martzloff[10] found them in 62.5 per cent; Rockstroh,[20] in 70.5 per cent; Skamnakis,[28] in 53.8 per cent; Dreyfuss,[33] in 40.1 per cent; and Frank and Geist,[39] in 73 per cent.

In the present series of cases, fibromyomas were seen in 40.4 per cent, or 21 cases. This is a relatively high incidence and, in general, agrees with the incidence found by other men and seems to indicate some relationship between these two conditions.

Despite the opinion of DeSnoo[18] and Witherspoon,[19] it seems doubtful that hyperestrinism alone is the common cause of fibromyomas and adenomyosis, although they are probably associated in some manner.

Other Associated Benign Pelvic Pathology

The following is a table of frequency of pelvic infections (including salpingitis, oophoritis, metritis) and ovarian follicular cysts in cases of adenomyosis uteri.

In the present series, although inflammation was seen in only 57.7 per cent of the cases and follicular cysts in 21.9 per cent of the cases, it must be kept in mind that in only 75 per cent of the cases were both ovaries and tubes

TABLE III.

AUTHORS	PELVIC INFLAMMATION	OVARIAN FOLLICULAR CYSTS
Cullen		33.3%
Baldy and Longcope	50%	
Frankl		3.3%
Shaw		100 %
Jeffcoate and Potter		57 %
Babes		60 %
Witherspoon	Almost 100%	
Rockstroh		5.8%
Skamnakis	14%	9 %
Present Series	57.7%	21.9%

available for study, and complete sections of ovaries and tubes were available in none of the cases.

The incidence of follicular cysts, as reported in the literature, varies from 3 per cent to 100 per cent. This difference may be at least partially explained by the fact that authors disagree on how large a follicle should be before it is called a cyst. Perhaps the minimum size of the cysts should be added to each report. In the present series only the largest follicles were called cysts in the tabulation.

The variation in the incidence of reported pelvic infection in cases of adenomyosis uteri is, likewise, very wide. This variation may be at least partially explained by the fact that the cases in each of the several series belonged to different strata of society. The greater prevalence of gonorrheal infection among the poorer people is well known.

Pelvic inflammation and follicular cysts are particularly important in connection with Witherspoon's[19] theory of the genesis of endometrial hyperplasia and adenomyosis uteri. He contends that inflammation prevents follicular rupture, leading to hyperestrinism and thus to endometrial hyperplasia and adenomyosis uteri. As a matter of fact, he found inflammation present in almost 100 per cent of his cases of adenomyosis uteri, so that his results bear out his hypothesis.

However, in the present series, inflammation was found in only 57.7 per cent of the cases. While this is a considerable percentage, it certainly does not bear out Witherspoon's theory. And it can be seen by the above table that very few papers on this subject noted such a high incidence of infection.

Conclusions

1. Adenomyosis uteri occurs in 5 to 10 per cent of all myomatous uteri.

2. The uterine wall is the site of aberrant endometrial tissue in 15 to 30 per cent of all cases of endometriosis.

3. Adenomyosis uteri is most common in the fifth decade of life, as is endometrial hyperplasia.

4. Metromenorrhagia is the most common complaint, and dysmenorrhea second most common in patients with adenomyosis uteri.

5. The sustained interval nonsecretory endometrium is a part of the process leading to actual endometrial hyperplasia and should be classified with it. The early interval endometrium seems to occur in younger women and endometrial hyperplasia in older women, generally.

6. Adenomysis is associated with anovulatory menstrual cycles in a large percentage of cases, indicating that either hyperestrinism or lack of corpus luteum hormone is an important factor in the genesis of adenomyosis uteri. It cannot be said definitely, however, which one is responsible.

7. The high incidence of fibroids in adenomyosis uteri seems to indicate some relationship. However, this association is not frequent enough to make one conclude that one factor is responsible for adenomyosis uteri and uterine fibroids.

8. Pelvic inflammation and ovarian cysts occur quite frequently in cases of adenomyosis uteri. However, the conclusion that these conditions are factors in the development of adenomyosis uteri does not seem justifiable.

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COMPLICATIONS AND FETAL MORTALITY IN 136 CASES OF MULTIPLE PREGNANCY

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THE general complications characteristic of twin pregnancy and the great importance of prematurity as the cause of the high fetal mortality in twin pregnancy have been emphasized by many investigators in this field.[1-3, 6, 8] The increased incidence of the toxemias of pregnancy, polyhydramnios, prematurity, uterine inertia, and postpartum hemorrhage has frequently been mentioned. In a large series of cases Hirst[6] has recently pointed out the increase in maternal, stillbirth, and neonatal death rates in cases of multiple pregnancy, and emphasized the problem of prematurity and the danger of hemorrhage. Hirst, therefore, emphasized the importance of diagnosis in cases of multiple pregnancy, and advised a high caloric and mineral diet, good general hygiene, early admission to the hospital, and avoidance of oversedation in labor.

Another aspect of the problem is the method of handling the second twin. McIlroy and Evans[8] advise extracting the second twin if any signs of fetal distress occur or if the interval is prolonged beyond an hour, because of danger of asphyxia from separation of the placenta. Beck[2] recommends rupturing the membranes after twenty minutes, and considers it a mistake to delay interference longer than one hour. Hirst advises more time up to one hour and fewer versions to allow the uterus to readjust itself in order to minimize the risk of infection and postpartum hemorrhage. DeLee and Greenhill[3] do not wait more than twenty minutes for the second baby to deliver spontaneously. They say, "there is little, if any, good in waiting, but many dangers—death of the second child, hemorrhage, and infection."

In the ten-year period ending May 31, 1944, there were 136 cases of multiple pregnancy delivered on the Obstetrical Service of Bellevue Hospital. Of these, 135 were twin pregnancies, and in one there were triplets. The incidence of twin pregnancy delivered during this ten-year period was 0.8 per cent. There was one maternal death in this series of 136 cases. An analysis of the prenatal courses, the labors, and puerperia of these 136 patients reveals a great difference in fetal mortality rates and in complications of pregnancy and labor between multiple and single pregnancies. The findings in these respects in the series coincide generally with previous reports on this subject.

I. Fetal Mortality

The births, stillbirths, and neonatal deaths in this series are presented in Table I, which also compares the neonatal fetal mortality in multiple pregnancy and the death rates for all deliveries on the service during this period. The gross fetal mortality rate is tremendously increased in multiple pregnancy, being four times as great as in single pregnancy. Similarly, the corrected fetal death

TABLE I. THE GROSS AND CORRECTED FETAL MORTALITY RATES FOR MULTIPLE AND SINGLE PREGNANCIES IN A TEN-YEAR PERIOD

Total number of multiple pregnancies delivered		136
Total number of babies delivered		273
Total number of twin babies surviving		195
Deductible fetal deaths and stillbirths		53
1. Nonviable	42	
2. Those with congenital abnormalities	5	
3. Viable but macerated	4	
4. Unrelated deaths	2	
Nondeductible fetal deaths and stillbirths		25
Gross fetal mortality rate in twin pregnancy (General 10-year average for 15,398 deliveries = 7.0%)		28.1%
Corrected fetal mortality rate in twin pregnancy (General 10-year average for 15,398 deliveries = 5.5%)		9.1%

rate is higher, being about twice that observed in single pregnancy. The corrected fetal mortality rate was obtained by excluding stillbirths and neonatal deaths in which the birth weight was less than three pounds, deaths occurring in babies born with congenital anomalies incompatible with life, macerated stillbirths, and two deaths due to diarrhea on the tenth and twelfth days of life. There were 42 babies in the first group, those weighing less than 3 pounds at birth. It is this factor of prematurity that is the greatest danger the twin baby faces.

II. Duration of Pregnancy and Birth Weight

The duration of pregnancy is summarized in Table II. Only 72, or 53 per cent, of the patients delivered had been pregnant for thirty-six weeks or more.

TABLE II. DURATION OF PREGNANCY

WEEKS OF GESTATION	NUMBER OF PATIENTS	
40 or over	36	53%
38-40	14	
36-38	22	
34-36	12	23%
32-34	13	
30-32	6	
28-30	4	24%
26-28	4	
24-26	5	
22-24	7	
20-22	7	
Under 20	4	
Not determined	2	
Total	136	

The remaining 47 per cent were of less than thirty-six weeks duration of pregnancy, with 23 per cent being between thirty and thirty-six weeks, and 24 per cent being less than thirty weeks.

The average birth weight of the 273 babies born was 4 pounds, 7½ ounces. Only 116 babies weighed 5 pounds or more at birth. The largest baby born weighed 8 pounds, 10 ounces, while its twin weighed 7 pounds, 2 ounces. The mother of these twins died of a postpartum hemorrhage and was the only maternal death in the series; this case will be discussed in more detail later.

It is this factor of prematurity as illustrated by the low average birth weight and the small number of pregnancies progressing beyond 36 weeks of gestation that accounts for the high fetal death rate in multiple pregnancy.

III. Presentations

The various combinations of presentations together with their respective incidences are presented in Table III. The most frequent combination was both

TABLE III. COMBINATION OF PRESENTATIONS OF FIRST AND SECOND TWIN IN 136 CASES OF TWIN PREGNANCY

PRESENTATIONS	NUMBER	PER CENT
Vertex-vertex	52	38.5
Vertex-breech	44	32.5
Breech-vertex	17	12.5
Breech-breech	10	7.4
Vertex-transverse	5	3.7
Vertex-compound	2	
Compound-breech	1	
Compound-vertex	1	
Breech-transverse	1	
Not determined	1	
	135	

being vertex presentations. Next most frequent was vertex-breech with the delivery being in this order. These two combinations accounted for 70 per cent of the cases.

IV. Duration of Labor

There was no appreciable effect on the duration of labor in cases of multiple pregnancy. The average duration of the first stage was 11.8 hours for primiparas and 7.3 hours for multiparas. The average duration of the second stage was 68 minutes for primiparas and 39 minutes for multiparas. The third stage averaged 10.9 minutes for primiparas and 7.4 minutes for multiparas. The average time elapsing between the two births was 16.4 minutes in primiparas and 21 minutes for multiparas.

A comparison of some of the complications of pregnancy and labor in multiple pregnancy with those occurring in single pregnancy reveals some interesting facts. These are summarized in Table IV.

TABLE IV. THE COMPLICATIONS OF PREGNANCY AND LABOR IN 136 CASES OF MULTIPLE PREGNANCY AND IN 15,398 CONSECUTIVE DELIVERIES

	IN 136 CASES OF MULTIPLE PREGNANCY		IN 15,398 DELIVERED PATIENTS
COMPLICATION	NUMBER	PER CENT	PER CENT
Toxemias of pregnancy	22	16.0	5.7
Postpartum hemorrhage	16	11.7	5.5
Uterine inertia	11	8.1	3.0
Polyhydramnion	8	5.8	0.5
Prolapsed cord	8	5.8	0.73
Fetal distress	5	3.6	2.35
Premature separation of placenta	4	2.9	1.1
Placenta previa	2	1.4	0.44
Hypertension	2	1.4	
Retained secundines	2	1.4	
Hyperemesis gravidarum	1		
Retained placenta	1		
Cervical laceration	1		

V. Acute Intra- and Postpartum Complications

(a) Polyhydramnion: This complication is 11 to 12 times more frequent in multiple pregnancy, the incidence being 5.8 per cent as compared with a ten-year average for all cases on the Bellevue Service (15,398 deliveries) of 0.5 per cent. This is not surprising when it is remembered that in multiple pregnancy there is a greatly increased surface of amnion as well as two fetal bladders to increase the amount of amniotic fluid.

(b) Toxemias of Pregnancy: Essential hypertension and hypertensive cardiovascular disease were not included in this classification which was limited to the mild toxemias, the unclassified toxemias, pre-eclampsia and eclampsia. Twenty-two of the 136 mothers, an incidence of 16 per cent, had some form of toxemia. This is almost three times more frequent than the ten-year incidence for all cases on the Bellevue Service of 5.7 per cent for the same complication. Of the 22 mothers, four had mild or unclassified toxemia, sixteen had pre-eclampsia, and two had postpartum eclampsia.

(c) Uterine inertia was more common in multiple pregnancy, being seen in 8.1 per cent of cases as compared with a ten-year average for all cases of 3.0 per cent. There was no correlation between uterine inertia and polyhydramnion, the two occurring together in only one instance. There was a relationship between inertia and postpartum hemorrhage, however, 25 per cent of the cases of postpartum hemorrhage also having uterine inertia. The overdistention of the uterus with resultant impaired contractility of the uterine muscle accounts for this increased incidence of uterine inertia. The greater the combined weight of the two babies the more likely it was that inertia would develop. Of the eleven patients exhibiting uterine inertia, the combined birth weight totalled well over 10 pounds in seven cases, and over 8 pounds in ten cases.

(d) Postpartum hemorrhage, that is—a blood loss of 500 c.c. or over, was also more frequently encountered in multiple pregnancy, the incidence being 11.7 per cent as compared with a corresponding ten-year average for all cases on the Bellevue Service of 5.5 per cent. Throughout this period oxytocic drugs were used routinely.

Of the sixteen mothers having a postpartum blood loss of 500 c.c. or over, ten were multiparas and six were primiparas. Twenty-five per cent had associated uterine inertia, as already mentioned. There were two cases of associated polyhydramnion. This increased tendency toward postpartum hemorrhage where there had been overdistention of the uterus with subsequent poor contractility of the uterine muscle has long been recognized. The danger of postpartum hemorrhage in multiple births should always be kept in mind and should be especially anticipated if uterine inertia is associated.

There was one maternal death among these cases of multiple pregnancy, the cause being a postpartum hemorrhage of 2,300 c.c. This patient was a "grande multipara" who had already had 11 babies. She was delivered in 1936 of twins weighing 7 pounds, 2 ounces and 8 pounds, 12 ounces. Her labor of twenty-one hours was complicated by uterine inertia and a second stage of three hours. Both babies were delivered by breech extraction. The placenta failed to separate following delivery and had to be removed manually because of bleeding after a 45-minute third stage. This was during the period before the hospital had a blood bank, and the mother died before blood transfusions could be administered. Her babies developed diarrhea several days later and died, one on the tenth day of life and one on the twelfth day. These two infant deaths are not included in the corrected fetal mortality rate, but are the two unrelated neonatal deaths in Table I.

(e) Prolapse of the umbilical cord. This accident occurred eight times, an incidence of 5.8 per cent, as compared with a ten-year average for all deliveries of 0.73 per cent. The babies were saved in all these eight patients, except in one where the infants were nonviable. The corrected fetal mortality rate due to cord prolapse therefore was 0. This is due to the fact that the accident occurred in the second stage in all cases, and after the first baby had been born in all cases but one. The cause of the increased incidence of prolapse of the cord is that not only is there a higher incidence of malpresentation in multiple pregnancies, but also the second presenting part is frequently found well above the inlet with the cervix fully dilated. It is common to rupture the membranes of the second sac artificially after the first baby has been born. To avoid prolapse of the cord this artificial rupture should be delayed until there is enough adaptation of the presenting part to the inlet to minimize this danger.

(f) Less frequent complications of multiple pregnancy were fetal distress, premature separation of the placenta, and placenta previa. Although the percentage of incidence of each was slightly higher than in single pregnancies, the small values involved leave them with no significance.

There was one case of fetus compressus or papyraceous born with a viable, living twin in this series. There was no instance of locking of twins.

TABLE V. CORRECTED MORTALITY RATE FOR BOTH TWINS

Spontaneous delivery	9.5%
Operative delivery	14.1%

The viable fetal deaths in this series were further studied by comparing the corrected fetal mortality rate for twins delivered spontaneously with the corrected fetal mortality rate for twins born by an operative delivery. These values were 9.5 per cent and 14.1 per cent, respectively. The group delivered spontaneously had a somewhat lower death rate. Spontaneous deliveries included spontaneous vertex deliveries, spontaneous breech deliveries, and assisted breech deliveries. Operative deliveries included forceps deliveries, breech extractions and versions, and breech extractions. Cesarean sections were excluded from this calculation since, in all cases where cesarean section was performed, the indications for operation were in no way related to the fact that a multiple pregnancy existed.

The corrected fetal mortality rate for the first twin, when analyzed separately, revealed the fact that the death rate was higher in the spontaneous group than in the operative group. Of the 88 delivered spontaneously, 7, or 7.9 per cent, died. Of the 18 delivered operatively, one, or 5.5 per cent, died. Cesarean section deaths are excluded. In the spontaneous group there were five spontaneous vertex deliveries. The main finding at autopsy in all of these was prematurity; one case also showed subdural hemorrhage and another showed evidence of asphyxia. In this same spontaneous group were one spontaneous breech delivery and one assisted breech delivery; both showed prematurity at autopsy and the latter showed evidence of asphyxia in addition. This, however, was an intrapartum fetal death without maceration.

The fetal death in the first twin group delivered operatively was due to asphyxia.

TABLE VI. FETAL MORTALITY ACCORDING TO METHOD OF DELIVERY OF FIRST TWIN

TYPE OF DELIVERY	TOTAL DELIVERED	TOTAL VIABLE AND NONMACERATED	VIABLE DEATHS
Spontaneous vertex	79	68	5 (7%)
Spontaneous breech	5	3	1 (33%)
Assisted breech	19	17	1 (6%)
Breech extraction	3	1	0
Version and extraction	1	1	0
Low forceps	14	10	0
Midforceps	6	6	1 (16%)
Cesarean section	5	3	1 (33%)
Complete abortion	4	0	0
	136	109	9
Corrected Fetal Mortality for First Twin:			
Spontaneous delivery	88		7 (7.9%)
Operative delivery (excluding section)	18		1 (5.5%)

These results are summarized in Table VI, and further details of each case of fetal death are presented in Table VII. The outstanding factor in these first twin deaths is the low birth weight further illustrating the great importance of prematurity as the major problem in fetal mortality in multiple pregnancies.

On analyzing the corrected fetal mortality rate for the second twins it was found that the spontaneous group had a lower death rate than the operative group, the figures being 12.5 per cent and 16.6 per cent, respectively. The four deaths occurring in the 29 viable spontaneous deliveries were attributable to asphyxia in three instances, to prematurity in one. There was an interval of thirty-eight minutes between twins one and two in one case. Both breech deaths were due to prematurity.

The operative group of the second twins had a corrected mortality of 16.6 per cent. Of twenty-one babies delivered by breech extraction five, or 23.8 per cent, died. Only one, or 4 per cent, of 25 viable babies delivered by version and breech extraction died. This peculiar discrepancy from the breech extraction death rate is accounted for by the fact that the average weight of the 21 breech extraction babies was 4.7 pounds, while the average weight of the 25 viable version and breech extraction babies was 5.45 pounds. The major cause of death at autopsy in all but one of the breech extraction babies was prematurity; the remaining one died of asphyxia. The one version and breech extraction death was due to prematurity; the indication for intervention in this case was malpresentation. Indications for operative delivery in the five cases of breech extraction were not given, although in one case the time elapsing since the birth of the first twin was over twenty minutes, and presumably the indication was no progress.

Three of the nine babies delivered by low forceps died, a 33 per cent mortality. Although prematurity was a major finding at autopsy in all three, brain hemorrhage was found in two instances. Prematurity was the indication for forceps in two cases, bleeding in one. Prematurity probably should not be considered an indication for forceps in the case of the second twin, since the birth canal has already been prepared for delivery by the passage of the first baby. This is borne out by the fact that these were the only two instances where pre-

TABLE VII. ANALYSIS OF DEATHS AMONG FIRST TWINS

NAME	PARITY	WEEKS OF GESTATION	DURATION OF LABOR (HR.)	BIRTH WEIGHT (LB., OZ.)	PRESENTATION	COMPLICATIONS OF PREGNANCY AND LABOR	TYPE OF DELIVERY	INDICATION FOR OPERATIVE DELIVERY	CAUSE OF FETAL DEATHS
MC	1	34	1.3	3-1	V		Spontaneous vertex		Prematurity
RF	1	34	17	3-9	V		Spontaneous vertex		Prematurity; subdural hemorrhage
DH	2	40	35	3-8	Br	Fetal death Intrapartum	Assisted breech		Asphyxia; prematurity
IW	0	36	10.5	3-11	Br	Syphilis, morphine addiction	Spontaneous breech		Prematurity; incomplete expansion of lungs
MP	1	?	14.25	3-11	V		Spontaneous vertex		Prematurity (no autopsy)
RB	11	39	3	4-4	V	Toxemia of pregnancy Postpartum hemorrhage	Spontaneous vertex		Asphyxia, prematurity, aspiration of amniotic fluid
RB	13	40	4.75	4-6	V	Polyhydramnion Postpartum hemorrhage	Spontaneous vertex		Prematurity
HK	6	32	0	3-10	Br	Placenta previa	Cesarean section	Placenta previa	Prematurity
AA	0	32	22	4-9	V	Postpartum hemorrhage	Midforceps	Fetal distress	Asphyxia, nonexpansion of lungs

maturity was the indication for forceps delivery of the second twin, and death occurred in both instances.

One of the five babies delivered by midforceps died, a mortality rate of 20 per cent. The indication for forceps was pre-eclampsia.

These facts and further details in the case of each viable fetal death in the group of the second twins are presented in Tables VIII and IX.

TABLE VIII. FETAL MORTALITY ACCORDING TO METHOD OF DELIVERY OF SECOND TWIN

TYPE OF DELIVERY	TOTAL DELIVERED	TOTAL VIABLE AND NONMACERATED	VIABLE DEATHS
Spontaneous vertex	33	29	4 (13%)
Spontaneous breech	10	4	1 (25%)
Assisted breech	18	15	1 (6.6%)
Breech extraction	27	21	5 (23.8%)
Version and breech extraction	25	25	1 (4%)
Low forceps	9	9	3 (33%)
Midforceps	5	5	1 (20%)
Cesarean section	5	2	0
Complete abortion	5	0	0
	137	110	16
Corrected Fetal Mortality for Second Twin:			
Spontaneous delivery	48		6 (12.5%)
Operative delivery (excluding section)	60		10 (16.6%)

Although the corrected fetal mortality rate was higher in the group of second twins delivered by an operative route, analysis of the individual cases leads to the conclusion that the more important factor leading to fetal death was prematurity rather than the method of delivery. Any method of delivery, spontaneous or operative, is dangerous for a small, premature baby. However, since the fetal death rate was higher in the operative group, a further conclusion is necessarily that operative delivery should not be carried out prematurely, but only after giving the second twin time in which to deliver spontaneously unless bleeding or signs of fetal distress develop. The maximum time allotted for spontaneous delivery of the second twin by DeLee and Greenhill[3] is twenty minutes. Others give up to one hour. In this series the average time between twins was 16.4 minutes for primiparas and 21 minutes for multiparas. Where the second twin delivered spontaneously, the average elapsed time was 12.5 minutes. *Of those second twins allowed more than twenty minutes in which to deliver spontaneously, 63 per cent were eventually delivered by an operative method.* It would appear, therefore, that twenty minutes should be sufficient time to allow for spontaneous delivery of the second twin. Immediate intervention is indicated before this time if bleeding or signs of fetal distress occur.

Summary and Conclusions

1. In 136 cases of multiple pregnancy delivered in ten years on the Bellevue Obstetrical Service, the gross fetal mortality was four times greater than the gross fetal mortality for all deliveries during the same period. The corrected fetal mortality for twins was almost twice as great as the ten-year average for all deliveries.

TABLE IX. ANALYSIS OF DEATHS AMONG SECOND TWINS

NAME	PARITY	WEEKS OF GESTATION	DURATION OF LABOR (HR.)	BIRTH WEIGHT (LB., OZ.)	PRESENTATION	COMPLICATIONS OF PREGNANCY AND LABOR	TYPE OF DELIVERY	TIME BETWEEN DELIVERIES (MIN.)	INDICATION FOR OPERATIVE DELIVERY	CAUSE OF FETAL DEATH
CC	0	40	28.75	4-0	V		Spontaneous vertex	9		Prematurity
BT	i	36	6	5-8	V	1 loose loop of cord around neck	Spontaneous vertex	38		Asphyxia, incomplete expansion of lungs
MP	i	?	14.25	3-13	Br		Spontaneous breech	10		Prematurity (no autopsy)
AA	0	32	22	4-13	V	Fetal distress Postpartum hemorrhage	Spontaneous vertex	?		Asphyxia, nonexpansion of lungs
HG	0	39	5	4-4	V		Spontaneous vertex	15		Aspiration of amniotic fluid
VJ	0	33	3	3-11	Br	Anemia, pyelitis	Assisted breech	8		Prematurity
MB	0	36	8	6-0	Br	Toxemia of pregnancy	Breech extraction	5	None	Asphyxia (no autopsy)
ME	ii	32	3	3-12	Br		Breech extraction	20	None	Prematurity
MC	i	34	1.3	3-7	Br		Breech extraction	10	None	Prematurity
RF	i	34	17	3-9	Br		Breech extraction	11	None	Prematurity
JL	0	37	8.5	3-11	Br	Pulmonary atelectasis	Breech extraction	?	Not given	Prematurity, aspiration of amniotic fluid
CJ	0	34	11.5	3-10	Comp.	Polyhydramnion	Version and breech extraction	15	Compound presentation	Prematurity (no autopsy)
EH	0	41	25	4-9	V	Laceration of cervix; postpartum hemorrhage	Low forceps	4	Bleeding	Prematurity; brain hemorrhage
DH	ii	35	2	3-1	V		Low forceps	17	Prematurity	Prematurity; incomplete expansion of lungs
MM	0	33	12	3-11	V		Low forceps	18	Prematurity	Intracranial hemorrhage; prematurity
BW	0	40	9	3-8	V	Pre-eclampsia	Midforceps	?	Pre-eclampsia	Prematurity (no autopsy)

2. Prematurity was the outstanding cause for the greatly increased fetal mortality in multiple pregnancy. Only 53 per cent of the multiple pregnancies were carried beyond 36 weeks of gestation. The average birth weight was 4 pounds, 7½ ounces.

3. The order of frequency of various possible combinations of presentations has been presented.

4. There was no appreciable effect upon the duration of labor.

5. The toxemias of pregnancy, polyhydramnion, uterine inertia, prolapse of the umbilical cord, and postpartum hemorrhage were much more frequently encountered in multiple pregnancy.

6. The method of delivery of either twin was of secondary importance to the factor of prematurity insofar as fetal mortality was concerned.

7. Fetal mortality was higher in the second twin when delivered by an operative procedure. The second twin, therefore, should be allowed about twenty minutes for spontaneous delivery unless bleeding, evidence of fetal distress or maternal complications necessitate immediate intervention. It would not appear advantageous to wait longer than twenty minutes.

8. Prematurity should not be considered an indication for forceps delivery of the second twin.

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A REPORT ON 2,798 VAGINAL HYSTERECTOMIES*

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THIS report covers 2,798 vaginal hysterectomies for benign disease of the uterus performed at the Presbyterian Hospital, Chicago, by the attending† and resident staff. For comparison, this study has been divided into two groups, 1,361 (Group I) vaginal hysterectomies done by Dr. N. Sproat Heaney from 1922 through May, 1945, and 1,437 (Group II) done by the other members of the attending and resident staff from 1931 through 1944. In 1935, Heaney[1, 2] reported the first 627 cases in his total; these are included in this study with the additional 734 vaginal hysterectomies which he has done since that time.

With but minor individual variations, the technique developed and described by Heaney[3] has been followed in these operations. The technical procedures of this operation need not be reviewed in this discussion, but certain important points may well be re-emphasized. One of the most essential factors in any surgical operation is the decision as to the method of approach. The surgeon's ability to determine the safest and best anatomic and therapeutic means of correcting the pathology is as important to the patient as the technical skill of the operator. We feel that the reason that the resident staff has maintained a mortality rate comparable to that of the attending staff is largely due to the fact that we have insisted on adequate preoperative preparation and strict adherence to details of technique. We firmly believe that once the choice as to the proper method of removal of the uterus has been made by one experienced in these decisions, the mortality rate is affected very little by the difference in the manual dexterity of the surgeon. Under supervision, the residents have begun with simple vaginal hysterectomy and progressed through the more complicated procedures involving the removal of adnexal pathology or extensive repair. To substantiate this statement, we offer the comparison of these two groups.

It would seem only logical that the first and probably most important point in technique is the determination whether or not the pathologic conditions can best be corrected by the vaginal or by the abdominal route. Since most hysterectomies are done on multiparous women, some form of vaginal plastic is frequently indicated. If the vaginal route is not elected the operator has three choices: (1) a two-stage operation necessitating two hospitalizations, two anesthetics, and almost double the risk of a single major procedure; (2) a plastic operation followed immediately by a laparotomy which lengthens the operative and anesthetic time; (3) correction by laparotomy of the intra-abdominal pathology only, completely ignoring, as is so frequently done, the vaginal relaxation with its commonly associated condition of urinary incontinence. The patient certainly is entitled to a correction of all the pathology present by the best

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and safest method that does not increase the surgical risk. The method chosen should be based upon this consideration alone and not upon the comfort, convenience, or limitations of the surgical team.

Indications for Vaginal Hysterectomy

We are firmly convinced from our observation of the patients in this series, that when a hysterectomy is indicated the vaginal route affords by far a lower mortality, morbidity, and a better final surgical result than the abdominal route. There is also much less postoperative discomfort. This is attested to again and again by patients who have undergone previous abdominal surgery. We agree with H. O. Jones[4] in his discussion of a paper on hysterectomy by Philip H. Smith,[4] in which he states that "measuring the discomfort by the amount of postoperative sedation, vaginal hysterectomies require 25 per cent less than do abdominal hysterectomies." Abdominal incision with its subsequent scar produces more discomfort and psychic trauma to the patient than does an incision concealed in the vaginal vault. Atelectasis, pneumonia, and other pulmonary complications are less frequently encountered following vaginal operations because there is no abdominal incision to splint the abdomen and interfere with excursions of the diaphragm. We agree with Waugh[5] that thrombophlebitis is much less common because of the decreased trauma to the large pelvic veins. There were only four cases of definite thrombophlebitis in our series. We believe that the incidence of pelvic abscess and pulmonary embolus is less frequent for the same reason. However, we also believe that there is another contributory factor in the decrease in these infectious processes, namely, preoperative elimination of foci of infection. This point will be discussed in more detail under preoperative preparation of the patient. In the rare instances where pelvic abscesses do occur, we have encountered no difficulty in adequately draining them through the vaginal incision. The danger of injury to the bowel by actual perforation or by the use of a large abdominal pack is definitely less in vaginal surgery, and therefore the disk of postoperative adhesions, ileus, and bowel obstruction is minimized. Gas pains are less severe for these same reasons.

We have had no experience in removing the uterus by the clamp method described by Kennedy,[6] in which he emphasizes the increase in the length of the vagina over that when mass ligation of vessels is practiced. We have never been able to understand the common belief that the vagina is shorter after vaginal than after abdominal hysterectomy. If the severance point of the vagina is the same in each case, how can the route of the removal of the uterus make any difference? When a woman has a large prolapse the vagina is shorter than usual, and will be short whether the uterus is removed vaginally or abdominally. We feel that the relatively minor shortening of the vagina following total hysterectomy by any method that may be used adjusts itself very rapidly under the pulsion stress of intercourse. We have all observed this deepening in the production of artificial vaginas as epitomized by Frank[7] in his reported cases. Gynecologic literature is replete with reports of carcinoma of the cervical stump following subtotal hysterectomy. Von Graff[8] reported 4,269 cases of cervical car-

cinoma, 4.1 per cent of which occurred in the cervical stump. Meigs[9] reported 1,218 cases with an incidence of 2.13 per cent of the stump. Masson[10] reported 1,181 cases, with an incidence of 3.97 per cent. This gives an average incidence of 3.4 per cent of carcinoma occurring in the cervical stump in 6,668 patients having carcinoma of the cervix. In our opinion, such reports definitely indicate complete removal of the uterus by either vaginal or abdominal hysterectomy unless the immediate surgical risk of complete removal outweighs the chance of stump carcinoma. Vaginal hysterectomy is a distinct advance, in keeping with the increasing trend of most of the large clinics toward complete hysterectomy.

Waugh corroborates Averett's[11] observation that vaginal hysterectomy carries a lower mortality rate than does a menopausal dose of radium for benign lesions in the uterus. We subscribe fully to this statement and feel that selective vaginal surgery is far less radical than the frequently devastating effects of radium or x-ray with all of their sequelae on the female genitals and contiguous structures. Malignant changes which may occur in the functionless pelvic organs following irradiation are prevented by complete surgical removal.

We agree with the statements of many authors in dealing with hysterectomy that bad operative risks are better handled by vaginal hysterectomy. However, if vaginal hysterectomy is a safer procedure for bad operative risks, should not it be by far the safest one for good operative risks? Therefore, we feel that the contraindications for vaginal hysterectomy should be less rigid.

Contraindications to Vaginal Hysterectomy

In view of our indications given above, it is obvious that our contraindications are much less rigid than those proposed by most surgeons. We believe that the only fundamental contraindications to vaginal hysterectomy are conditions which obviously would increase the risk of vaginal over abdominal removal, or the presence of additional intra-abdominal pathology requiring a laparotomy. The size, position, mobility, and accessibility of lesions are so variable that no indication or contraindication should be considered unchangeable. The bulk of a uterus to be removed is probably less a contraindication than is the location of its component parts. A large fibromyoma situated in the cul-de-sac or on the fundus can frequently be removed more easily than can a small tumor located directly beneath the bladder or between the leaves of the broad ligament. Tumors in the latter location, even though small, may greatly interfere with the securing of the uterine arteries.

Heaney[2] and Babcock[12] have demonstrated that large fibromyomas may be safely removed by morcellation if the uterine vessels have first been ligated. Morcellation is a tedious procedure for the surgeon, but the accumulated reports of vaginal hysterectomy demonstrate that it should not be denied the patient out of consideration for the operator. The site of a tumor growth may somewhat limit the mobility of the uterus but complicating pathology, such as endometriosis, chronic pelvic infection, and diverticulitis of the colon, are much more apt to produce insurmountable fixation. Ovarian tumors of large size associated with uterine pathology usually contraindicate vaginal hysterectomy. This is especially true if the ovarian enlargement is suggestive of malignancy; however,

many times the nature of an ovarian swelling can be determined preoperatively with a fair degree of certainty. The smaller benign ovarian cysts, such as follicular and chocolate cysts or dermoids, may be safely removed vaginally following hysterectomy. A posterior colpotomy as a preliminary step in hysterectomy will often disclose not only the nature of the adnexal swelling, but also the removability of the pathology in question. Direct observation of the lesion will determine the course of the subsequent procedure. In our series, previous pelvic or other abdominal surgery was not found to be as limiting as it seems to have been to other surgeons. In Group II, 34.3 per cent of the patients had had some form of previous abdominal surgery (Table I).

TABLE I. PREVIOUS ABDOMINAL SURGERY

GROUP II*	
TYPE OF OPERATION	NUMBER OF PATIENTS
Appendectomy	339
Cholecystectomy	53
Uterine suspension	24
Oophorectomy	18
Salpingectomy	14
Cesarean section	13
Herniorrhaphy	11
Laparotomy	10
Myomectomy	6
Nephrectomy	3
Gastric resection	2
Intestinal obstruction	1
	494

494 patients, or 34.3 per cent, in Group II had some form of previous abdominal surgery.

*Total for Group I not tabulated.

Uterine suspension was the third most common of these abdominal operations. Unfortunately, these figures for Group I were not tabulated. In general, any previous abdominal operation can complicate a hysterectomy from above as well as one from below. However, we feel that in many instances adhesions low in the pelvis were visualized and freed more easily through the vagina than would have been possible from above. In like manner, the adnexa are accessible to direct vision, and usually may be removed easily through the vaginal opening. In Group I, 247 patients had one or both ovaries removed, and 336 had unilateral or bilateral salpingectomy. In Group II the incidence was 91 and 81, respectively. Routine inspection of the adnexa is an integral part of vaginal extirpation of the uterus. We have had the opportunity to observe peritonealization following vaginal hysterectomy from the abdominal side in a few instances where an acute abdominal condition has necessitated a laparotomy during early convalescence, and in those few patients who came to autopsy. Peritonealization is adequate if the closing sutures are correctly placed. The most important sutures are those which secure the lateral corners of the vaginal cuff. These are introduced through the anterior vaginal mucosa, continued over the base of the bladder, through the peritoneum of the anterior cul-de-sac, thus obliterating dead spaces. With the same suture, the peritoneum is followed laterally to where the two leaves of the broad ligament have been divided. A running suture

in this way covers all raw areas and places the stump extraperitoneally. When the suture is continued through the peritoneum of the cul-de-sac of Douglas and out through the posterior vaginal mucosa, the vessels are doubly ligated and the peritoneum is closed tightly as the suture is tied.

We have all felt that some of the most difficult cases in this series were those undertaken for the cure of prolapsus uteri. The extensive dissection necessary to correct the commonly associated pathology of cystocele, urethrocele, and enterocele frequently makes this operation extremely technical. Due to the displacement of the bladder, ureters, and rectum, there is an increase in the possibility of injury to these structures. Our residents in their training for vaginal surgery advance from hysterectomy in the nullipara or virgin to the more difficult cases of prolapsus uteri. As indicated above we do not subscribe to the general statement that nulliparity is a contraindication to vaginal hysterectomy. This is a direct contradiction to the idea advanced by many men that a considerable amount of pelvic relaxation must be present in order to make a vaginal hysterectomy permissible. Even in virgins, sufficient exposure can usually be obtained by simple stretching or incision of the hymeneal ring. Episiotomy is rarely indicated, and then need not be extensive. Approximately one-third of the patients in this series were nulliparas. We feel that a simple perineal incision, when necessary, will heal with less risk and discomfort to the patient than will an abdominal incision.

Preoperative Preparation of the Patient

Hysterectomy is rarely an emergency operation. Sufficient time is usually available for adequate preoperative study and preparation of the patient. We believe that a considerable percentage of the postoperative complications which we have encountered in this series may have been due in part to a failure to complete fully such a study. We have previously referred to elimination of foci of infection as one of the prime requisites for good primary healing and uncomplicated convalescence after any operation. Distant foci, such as infected teeth, tonsils, sinuses, respiratory mucous membrane, or digestive tract can, we believe, be etiological factors in causing infections of the operative site which, because of trauma, is a point of lowered resistance. We feel that the same factors are the greatest cause of postoperative thrombophlebitis. In like manner we are convinced that proper healing is frequently interfered with by inadequate hemostasis or by disregarding pathogenic bacteria in the vagina. It would seem self-evident that an incision through a field that is infected is more dangerous than when the normal flora of the vagina is present. Far too frequently pelvic operations are undertaken in the presence of an unrecognized, nonvenereal type of vaginitis, such as trichomonas, monilia, or nonspecific infection, when the surgeon would not consider an operation in the presence of gonococci. We have conscientiously tried to check and eliminate all of these pathogenic conditions before operation. In reviewing our failures, we believe that many of the morbid postoperative conditions can be traced to our neglect to eliminate fully all possible foci of infection, or to obtain adequate hemostasis. Preoperative correction

of anemia, vitamin balance, and restoration to normal of blood protein which have been lowered by blood loss or poor nutrition are essential for resistance to infection and proper healing. Transfusions of whole blood or plasma preceding or during the operation are of equal or greater benefit to the patient's resistance than any ordinary antiseptic agent used in cleansing the vagina.

Morbidity

The morbidity in this study has been calculated on the usual standard of morbidity for surgical patients, namely, a temperature of over 100.4° F. on any two consecutive days, excluding the first twenty-four hours. We thoroughly agree with Phillips[13] that this is not a true measure of gynecologic morbidity. On this basis, however, 66 per cent of Group I and 61 per cent of Group II were not morbid. In Group I, 34 per cent of the patients had a temperature of over 100.4° F. for one or more days, and 30 per cent of the patients in Group 2 had a temperature of over 100.4° F. for *no* more than two days. Thus, 91 per cent of the patients in Group II had a temperature of over 100.4° F. for *no* more than two days. We believe this illustrates an uncomplicated postoperative temperature curve for vaginal hysterectomy, since all of these patients had an otherwise uneventful convalescence. The statistics for morbidity in Group I were unfortunately not tabulated in group days. The findings above corroborate Jones and Doyle's[14] observations in their attempt to set up a temperature curve for normal convalescence in gynecologic surgery. On this basis we considered only 9 per cent of the patients in Group II to be truly morbid. However, adhering strictly to the usual standard of morbidity, 36.5 per cent, or 1,022, of the total 2,798 patients were morbid. This compares favorably with other morbidity studies of vaginal hysterectomy. We were able to recognize clinically the cause for morbidity in only 204 cases; therefore, we have subtracted this number from the total of 1,022, leaving 818 patients in whom the cause of the temperature elevation was undetermined. We have felt that these were most probably due to infections of varying degree in the operative site. The 9 per cent of the truly morbid patients usually gave definite evidence as to the cause of their prolonged fever, such as urinary tract infection, hematomas, or thrombophlebitis.

TABLE II. POSTOPERATIVE COMPLICATIONS

	GROUP I	GROUP II
Urinary tract infection	75	78
Postoperative bleeding, immediate or delayed	10	17
Pelvic abscess	2	8
Upper respiratory infection	1	7
Thrombophlebitis	1	3
*Intestinal obstruction	2	2
Pulmonary embolism	2	1
Cerebral embolism	0	1
Vesicovaginal fistula	2	3
Pituitrin shock	1	0
†Rectovaginal fistula	0	1
Prolapse of omentum into vaginal vault	1	0
Prolapse of ileum into vaginal vault	0	1
Parotitis	1	0
Prolapse of tube	26	–‡

*Two spontaneous recoveries, two deaths.
†Resulting from postoperative suturing for bleeding.
‡Not tabulated.

Infection in postoperative hematomas, or conversely, delayed hemorrhage as the result of postoperative infection comprise a considerable proportion of the cases of morbidity. In view of these findings it would seem that meticulous hemostasis at the time of operation is much more important than the speed with which the operative procedure can be completed. Even the small vessels divided in the dissection of the bladder or incision of the vaginal mucous membrane when not secured, may result in considerable immediate external postoperative bleeding or large hematomas. When infection occurs in these areas, however, spontaneous drainage frequently takes place. Bleeding during operation can be lessened by the preliminary injection of oxytocics into the paracervical tissues. In the early cases in this study pituitrin was used; one patient, however, developed shock symptoms following the injection of pituitrin. This phenomenon has been adequately described by Simon[15] in 1935, and at that time pitocin was substituted for pituitrin, and no untoward symptoms have been observed since this change. We do not believe that the use of oxytocics predisposes to postoperative hemorrhage, since in this series this complication, when it occurred, was usually late in convalescence, from the fifth to the fifty-sixth day. This would probably indicate that the factors necessary for primary healing, such as good general nutrition, proper vitamin balance, and normal bleeding and coagulation time were lowered or interfered with by infection. When operative measures are undertaken for the control of this secondary hemorrhage, wide separation of the vaginal vault and general oozing from all areas are frequently present. No fatalities have occurred from this delayed postoperative bleeding.

Accidentally or purposely, in order to remove a tumor, usually endometriosis, involving the bladder base, the bladder has been opened a number of times. Immediate closure of the rent with interrupted sutures in layers and the insertion of a retention catheter to be retained for a week or ten days resulted in primary healing, except in five cases when a vesicovaginal fistula resulted. Three of the five resulting fistulae healed following the insertion of a radium needle. The other two cases were cured by secondary operative closure. There was one case of rectovaginal fistula in this series. It was the result of suturing for postoperative beeding. To our knowledge nothing occurred in this series of cases either at the operation or afterward to suggest that we ever cut or ligated a ureter.

Prolapse of the Fallopian tube as a postoperative complication has been seized with avidity by many men who are opposed to vaginal hysterectomy. This occurred twenty-six times in Group I. Unfortunately, the figures for Group II were not tabulated. As Dr. Heaney[2] has explained in a previous article, "This accident is simply attended by making slight traction on the tube until it is completely delivered into the vagina, when a ligature is passed around the tubal mesentery and the tube burned off with a light nasal cautery. This generally requires no hospitalization. These patients suffered no more inconvenience than would be occasioned by the removal of excessive granulation tissue."

The average hospitalization for patients in Group I was 12 days, and in Group II was 13.5 days. The average for the last 72 patients in Group I was 10.8 days. This difference may be accounted for by improvement in technique,

the increased tendency toward early dismissal from the hospital or, since the number is small, it may not have included as many postoperative complications or as many extensive repairs, both of which conditions naturally lengthen the hospital stay and increase the chances of morbidity. The average stay for the 391 patients in Group II who had vaginal hysterectomy alone was 10.9 days.

A tabulation of additional operative procedures performed in these two groups is shown in Table III. This comparison illustrates not only the large number of associated lesions which can be adequately and safely treated per vaginam, but also indicates that as improvement in operative skill develops, more and more associated pathology can be corrected vaginally. Of the entire series, 2,098 patients, or 75 per cent, required additional surgery beyond that of simple vaginal hysterectomy.

TABLE III. ADDITIONAL SURGERY

	GROUP I	GROUP II
Posterior colpoperineorrhaphy	719	895
Anterior colporrhaphy	108	269
Urethroplasty	160	249
One or both ovaries removed	247	91
One or both tubes removed	336	81
Resection of endometrial transplants	–*	5
Removal of Bartholin cyst	10	3
Ventral herniorrhaphy	1	2
Removal of adenoma of the rectovaginal septum	14	–
Vulvectomy	5	–
Hemorrhoidectomy	10	–
Repair of rectovaginal fistula	1	–
Removal of mucoid cyst of colon	1	–
Repair of complete perineal tear	4	–

*Not tabulated.

The gross and microscopic pathology are shown in Table IV.

Listed in this table are some conditions, such as menorrhagia, metrorrhagia, retroversion, etc., which were only a part of a complex clinical picture. Alone, many of these conditions are not indications for removing the uterus, but when taken in combination with one or more other factors, they seem to indicate hysterectomy as the surest and safest way of curing all of the patient's symptoms with one operative procedure. The majority of the cases listed under uncontrollable menorrhagia, metrorrhagia, retroversion, and dysmenorrhea had previously had the benefit of the more conservative medical and surgical treatments without adequate relief. Six of the ten cases listed under pregnancy were performed on patients where hysterectomy had been advised, but the operation was delayed until they were pregnant in an attempt to get early ova for study. The remaining cases of pregnancy were either unsuspected, or the uterus was removed as a part of a therapeutic abortion and sterilization procedure. We all believe that, since hysterectomy is the surest method of sterilization, it is the method of choice when gross uterine pathology or marked disturbances in pelvic physiology is present, especially in older patients, particularly when in addition there is considerable relaxation of the pelvic floor to repair. The Brenner tumor and the bladder tumor were conditions found in addition to the pathology indicating vaginal hysterectomy.

TABLE IV. PATHOLOGY AND ASSOCIATED CONDITIONS REQUIRING HYSTERECTOMY

	GROUP I	GROUP II
Fibromyomata uteri	859	765
Uncontrollable menorrhagia or metrorrhagia	452	686
Prolapsus uteri	118	271
Hyperplasia of endometrium	–*	145
Dysmenorrhea	70	39
Adenomyosis	204	213
Retroversion	16	17
Endometriosis	44	31
Postmenopausal bleeding	29	6
Cervical polyp	—	59
Endometrial polyp	—	50
Pelvic inflammatory disease	—	12
Cervical fibroid	1	1
Erosions	—	177
Ovarian cyst	24	4
Nabothian cyst	—	130
Pregnancy	—	10
Dermoid cyst	10	4
Fibroma of the ovary	3	3
Brenner tumor	1	0
Stricture of the cervix (previous amputation)	23	—
Sterilization procedure	11	—
Bladder tumor	1	0
Previous interposition operation with bladder symptoms	3	0
Chocolate cyst	5	3
Chorionepithelioma	–*	2†
Persistent leucorrhea uterine in origin-postirradiation	17	1
Tubal pregnancy	2	1

*Not tabulated.
†One questionable diagnosis.

Mortality

The criteria by which any operative procedure should be judged are safety, effectiveness, and comfort to the patient. From a summation of the preceding data, it would seem that vaginal hysterectomy more completely fulfills the above criteria than do total or subtotal abdominal hysterectomy. We believe the various symptom-complexes of pelvic disease can be more effectively treated and completely relieved by vaginal than by abdominal surgery. We and our patients are convinced that, in general, vaginal surgery is less painful than is abdominal surgery. Abdominal hysterectomy in our hands has had approximately six times the mortality rate of vaginal hysterectomy. It is true that, when we cannot remove a uterus vaginally and must resort to the abdominal route, that case is often more serious than the average of the cases that we operate upon vaginally. However, this by no means explains the difference in mortality. We wish to emphasize that we do not reserve for abdominal operation the serious cases and operate vaginally only the simple ones. The determining factor to operate abdominally rather than vaginally was only occasionally that the uterus could not be removed vaginally. Usually the deciding factor was much simpler—a very large fibroid in a woman with a narrow vagina, bilateral ovarian cysts where the hysterectomy was coincidental, malignancy of the ovaries where hysterectomy was a necessary accompaniment, were some of the frequent indications for the choice of the abdominal route. The great difference in mortality

between vaginal and abdominal hysterectomy can be explained on no other basis in general than the inherent risks between the two methods of approach.

Our mortality rate in 898 abdominal hysterectomies during approximately the same interval by the same group of surgeons was 10 deaths, or 1.22 per cent.

TABLE V. CAUSES OF DEATH

	AGE	OPERATION	DIED	CAUSE
*1.	Mrs. M. Z. 40	Vaginal hysterectomy and posterior colpoperineorrhaphy	7th postoperative day	Peritonitis
2.	Mrs. B. C. 38	Vaginal hysterectomy, left oophorectomy	5th postoperative day	Intestinal obstruction
*3.	Mrs. A. C. 60	Vaginal hysterectomy, anterior colporrhaphy, urethroplasty, posterior colpoperineorrhaphy	18th postoperative day	Thrombophlebitis, pulmonary embolism, hypertensive heart disease.
*4.	Mrs. G. E. 34	Vaginal hysterectomy	6th postoperative day	Intestinal obstruction acute myocarditis
5.	Mrs. A. S. 49	Vaginal hysterectomy, posterior colpoperineorrhaphy	Day of operation	Hemorrhage
*6.	Mrs. F. Z. 45	Vaginal hysterectomy, right salpingo-oophorectomy, posterior colpoperineorrhaphy	31st postoperative day	Peritonitis, pelvic abscess, spontaneous drainage

*Autopsy.

NOTE.—Cases 1, 2, and 3 were in Group I. Cases 4, 5, and 6 yere in Group II.

TABLE VI. ABDOMINAL HYSTERECTOMIES: TOTAL AND SUBTOTAL

AUTHOR	NUMBER	DEATHS
Smith[4]	837	6
Miller and Prejean[16]	629	12
King[17]	537	5
Williams[18]	1,870	52
Mengert[19]	1,925	38
Bryan and Trabue[20]	29,442	849
McDonald[21]	2,628	27
Masson[10]	2,184	21
Dannreuther[22]	535	9
	40,587	1,019=2.5%
Campbell	898	10
	41,485	1,029=2.4%

TABLE VII. VAGINAL HYSTERECTOMIES

AUTHOR	NUMBER	DEATHS
Danforth[23]	517	0
Tyrone and Weed[24]	305	2
Waugh[5]	600	2
Averett[11]	934	3
Babcock[12]	300	0
Tofer[25]	210	0
Burwig[26]	100	1
Masson[10]	782	6
Miller and Prejean[16]	199	2
Smith[4]	363	0
Phillips[13]	84	1
	4,482	18–0.40%
Campbell	2,798	6
	7,280	24–0.32%

The mortality for these 2,798 vaginal hysterectomies was six deaths, or 0.214 per cent (Table V). These six deaths were equally divided between the two groups, three deaths occurring in each group. In Group I, those done by Heaney, 745 hysterectomies have been done since the last death.

Statistical study of the literature reveals an approximate comparison. The average mortality for abdominal hysterectomy, both total and subtotal, in 40,587 cases collected from the literature was 1,019 deaths, or 2.5 per cent (Table VI).

Only 18 deaths were reported in 4,482 vaginal hysterectomies, or 0.40 per cent (Table VII). The average rate for the entire series with our groups included is abdominal, 2.4 per cent; and vaginal, 0.32 per cent.

Summary

1. Two thousand seven hundred ninety-eight vaginal hysterectomies and 898 abdominal hysterectomies are reported, and the mortality is compared with 4,482 vaginal and 40,587 abdominal cases reported in the literature.

2. The mortality rate of the collected cases of abdominal hysterectomies is 7.5 times greater than that of vaginal hysterectomies.

3. Therefore, vaginal hysterectomy should be chosen whenever feasible because: (a) It permits a more regular correction of all defects than do other procedures. (b) The vaginal route causes less discomfort to the patient. (c) No abdominal scar is produced. (d) Pulmonary complications and emboli are less frequent. (e) Thrombophlebitis and pelvic abscess are less common. (f) Trauma to the bowel, postoperative adhesions, ileus and bowel obstruction are infrequent. (g) Gas pains are less severe. (h) It is less radical and safer than irradiation. (i) It affords a safe approach to many forms of adnexal pathology. (j) Peritonealization can be accomplished as accurately as by the abdominal route. (k) Stump carcinoma and persistent cervical discharge are prevented.

4. We agree with many who have advocated vaginal hysterectomy rather than abdominal hysterectomy in poor operative risks. It then seems logical that vaginal hysterectomy is an even safer procedure in patients who are in better operative condition.

5. Previous abdominal surgery need not always contraindicate vaginal removal of the uterus.

6. The technical skill of the operator is of no greater importance than is the choice of method of approach or preoperative preparation of the patient, such as: (a) eradication of foci of infection; (b) correction of anemia, vitamin, protein and fluid balance; (c) restoration of the normal vaginal flora.

7. Meticulous hemostasis is vitally important.

8. Adequate training in vaginal hysterectomy will equip a surgeon with the confidence and ability to treat many other gynecologic conditions by vaginal surgery to the great benefit of the patient.

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Discussion

DR. HAROLD O. JONES.—This very large series of operations so reduces the mathematical percentage of error that a true picture of results is obtained. We are all grateful to Dr. Heaney and his associates for the stimulation we have received from frequent reports of the results obtained in this type of operation.

We disagree with the essayist in his differentiation of "ability to decide the type of operation" from "the technical skill and manual dexterity of the surgeon." We believe these factors go hand in hand and improve as experience expands. Reduction in mortality and morbidity reflects increased experience. Careful supervision and training are responsible for the excellent showing of the resident staff.

Our experience has been that it is best to begin to teach others the technique of vaginal hysterectomy in patients with some relaxation and proceeding to other combinations of associate pathology as experience broadens. We must never forget that, for the average, this is a fairly difficult technical operation and must not be made to appear too simple. We must not forget that this society, in its discussions and clinics, sets a standard of accepted thought and technical procedures. This carries additional responsibilities.

As Campbell has said, if the uterus should be removed the vaginal route is preferable, if possible. With this we agree. All favorable factors are certainly true, and especially phlebitis and embolism. In a smaller series of our own we have not had an instance of phlebitis or pulmonary embolism. I am not so sure, however, of the exact reasons for this favorable phase.

All the indications offered for this type of operation are sound. We wish to join with the author in condemnation of the use of radium in benign uterine diseases as a substitute for hysterectomy. We have one additional observation which applies to results obtained by various plastic procedures without hysterectomy. In reviewing our own cases we have been impressed by the superior results obtained in similar conditions treated by vaginal hysterectomy.

The preoperative treatment outlined is especially thorough, and we are glad the author called attention to reduction of blood protein in many of these patients, quite certainly an important factor in recovery after operation. We are all well aware of the fact that now

ample time elapses between time that a decision to operate is reached and the time the patient is admitted to the hospital for almost any corrective procedure.

We also agree that removal of the uterus, whether vaginally or abdominally, does not shorten the vagina, but regardless of the type of procedure, the vagina will be shortened if cyst-rectocele prolapses and interocele are present. In many instances, the vagina is congenitally shortened before any of these pathologic conditions develop.

We do not want to be seemingly annoyingly persistent in this question of morbidity—we have presented remarks concerning this subject from this forum. Here is an excellent opportunity for the establishment of a norm-curve for vaginal hysterectomy. Certainly the comparison of these temperature curves to 100.4° F. for 48 hours is ridiculous.

Table III shows an increase in the percentage of patients who have had, in addition to vaginal hysterectomy, other reparative operations. We believe in almost every instance of vaginal hysterectomy in multiparous women that repair of the anterior and posterior vaginal walls should be done.

In Table IV, which deals with direct and associate pathology, significant figures appear; a few we repeat: menorrhagia and metrorrhagia, 686; hyperplasia of endometriosis, 145; erosions, 177; nabothian cysts, 130. We realize that these conditions represent in many instances the associate pathology in the same patient, but it emphasizes, however, that these patients are being treated by some reparative procedure which conserves the uterus. To this we subscribe wholeheartedly.

Again we commend the authors for their meticulous study of a very interesting group of patients, well treated and with enviable results.

DR. RALPH A. REIS.—We owe Dr. Heaney gratitude for gradually widening the indications for vaginal hysterectomy, for developing a superb technique, and for the Heaney clamp which has made vaginal hysterectomy a simpler operation. But I think that he and his group have been overenthusiastic.

I believe that the vaginal approach and the abdominal approach should be in no way competitive. Each method has its own indications and contraindications. If this were not so, the essayist would not be able to present 800 abdominal hysterectomies done during the time that 2,800 vaginal hysterectomies were performed. He stresses a proper choice of methods and then goes out wholeheartedly for vaginal hysterectomy alone. He does not have a choice when he has a preconceived notion that vaginal hysterectomy is the method of choice and is the safest way to do a hysterectomy. Under Dr. Campbell's list, the contraindications are, endometriosis, chronic pelvic infection, diverticulitis of the colon, and ovarian tumors associated with uterine pathology. It is amazing to me that only 12 patients out of some 2,900 should have some evidence of pelvic inflammatory disease. That is not true in the service at Michael Reese. Perhaps we did not screen the patients so as to avoid doing vaginal hysterectomy on those having pelvic inflammatory disease. At the present time we find we meet with this condition frequently and often inadvertently.

I am not enthusiastic for radium, but I would deny that vaginal hysterectomy carries a lower mortality than a so-called menopausal dose of radium, although the end results are less satisfactory.

I agree that previous abdominal surgery is no contraindication, particularly when 34.3 per cent of 494 patients had had some form of previous abdominal surgery. Breaking down these figures, we find that 28.2 were appendectomies, cholecystectomies, nephrectomies, and gastric resections. That type of abdominal surgery does not interfere with vaginal surgery. Only 6 per cent of the patients had had previous pelvic surgery. But previous pelvic surgery is not a contraindication for vaginal hysterectomy except in a few specific instances.

Vaginal hysterectomy is not an emergency operation, but I do contend that it is often an urgent operation. From Dr. Campbell's figures, more than half of the patients were operated upon for vaginal bleeding. Vaginal bleeding to my mind constitutes an urgent need for surgery. To permit bleeding for weeks and months while removing foci of infection in the way of teeth, tonsils, and sinuses is not helpful. It is an error in clinical judgment as are the other recommendations in preoperative care. I do not know how to restore the normal

vaginal flora. I have a great number of patients in whom I cannot get rid of Trichomonas. I have yet to learn how to restore vitamin balance. I do think that his one statement concerning preoperative preparation which is most important is that we use liberal and repeated blood transfusions.

Finally, I believe we should not compare mortalities by the abdominal and the vaginal method. He states that the mortality by the abdominal approach is six times more than it is by the vaginal approach. I deny the fundamental principle that all hysterectomies should be done vaginally, which even Dr. Campbell admits is wrong because he states that 800 out of 3,600 were done abdominally. If only the simpler ones were done vaginally and the so-called difficult ones were done abdominally, then certainly the comparison is erroneous. Finally, if our group at Michael Reese showed seven times as much mortality following abdominal hysterectomy as follows vaginal hysterectomy, I would suggest that we stop doing vaginal hysterectomy and do only abdominal hysterectomies to learn how to attain a safer and more comparable mortality.

DR. EDWARD ALLEN.—When Dr. Heaney found he could not come from California for this meeting, he sent me the following discussion of the paper. Dr. Heaney said:

"I am very glad that this paper was written, and I take a great deal of personal pride in this study. It is conceivable that one man might lie about his results in order to bolster his reputation, but it is hardly believable that the whole staff of a reputable hospital would do so.

"The papers that I have presented on vaginal hysterectomy have met with a good deal of skepticism; in some instances, I have been accused of falsifying the reports or at least have failed properly to emphasize the bad results obtained. However, in all the papers, as well as this one, every detail of importance has been given, and an honest attempt has been made to set before the profession all the known facts.

"This paper presents the largest collection of vaginal hysterectomies with the lowest mortality when the number of cases reported is taken into consideration. It will be noted that I personally performed 745 vaginal hysterectomies since the death of the last patient, which is the largest number of cases reported without fatality.

"I wish, however, to state that from now on, in the hands of careful operators, our record read to you tonight should be easily surpassed in the future.

"The six deaths reported in this paper all occurred, or largely so, at least, before the use of chemotherapy and antibiotics. Two of the deaths were due to peritonitis, which might well have been prevented by the use of sulfonamides and penicillin. One death was due to a pulmonary embolus secondary to a thrombophlebitis, underlying which was an inflammation. Two cases were due to intestinal obstruction, of which an inflammation might well have been the cause. One death was due to hemorrhage, the only death which would not have been modified by the present-day therapy, so it is quite probable that in the future large series of vaginal hysterectomies may be reported without a single fatality."

DR. CHANNING W. BARRETT.—I have looked upon my work with the idea that there are a lot of things to be done for a woman besides vaginal hysterectomy. I started many years ago with the idea that vaginal hysterectomy had many advantages, but I never got away from the idea that it was not applicable to all cases. There are as many cases in which the indications are for abdominal hysterectomy as for vaginal hysterectomy, and I do not think we should let the idea go forth that vaginal hysterectomy is superior in all cases. It is not a simple operation, not as simple as the essayist made it appear. Heaney does a wonderfully safe vaginal hysterectomy. He does vaginal hysterectomy that I have seen that certainly should have been done abdominally. We will not go into the question of what is the indication for one and what is the indication for the other, but I would like to call attention to the fact that they speak of these vaginal hysterectomies for "prolapse." These are prolapses, they are hernias. There is much talk of prolapse and relaxation where the condition is one pelvic floor injury and resulting herniation. What did the condition come from? Stress and strain. If the woman has had stress and strain until she has no pelvic floor and no musculofascial structure, would the diagnosis of relaxation be correct? It is not relaxation, it is a hernia, with the absence of any musculofascial floor.

The question I would like to ask the essayist is, do you consider vaginal hysterectomy the treatment for what I call herniation or what you see fit to call prolapse of the uterus? If it is prolapse of the uterus, what do you do with the rest of it, because that is not all of the pathology. If there is herniation of the uterus, there is herniation of a lot of other structures. What do you do with those hernias? I do not consider that vaginal hysterectomy is the treatment for herniation. It may go with the herniation and other things for which the uterus should be taken out. You do vaginal hysterectomy for pathology that is in the uterus. You cannot do vaginal hysterectomy for pathology that is left in. That is not the treatment for herniation.

DR. CHARLES E. GALLOWAY.—I have some questions that we might ask about this series of 2,700 vaginal hysterectomies. There has been no mention made of the discovery of any early cervical carcinomas. I realize that this series is on benign cases, but it seems to me we remove a uterus now and then in which we discover an early carcinoma. Were such discoveries made?

Also, we find that anemia is a common condition following vaginal hysterectomy, more so than following abdominal hysterectomy. Postoperative anemias are sometimes quite severe. We think this operation requires a man to move quite rapidly because of the fact that back bleeding occurs from unclamped vessels in the opposite side of the uterus as it is being removed.

Moreover, the time required to remove the uterus through the vagina is a factor to consider. In our hands the ordinary vaginal hysterectomy requires seventy-two minutes, and, where we do a repair also, it takes about eighty-five minutes. These figures are much larger than those for abdominal hysterectomy.

Our ratio of abdominal to vaginal hysterectomy is 2.6 to 1. Over the last five years we had 298 vaginal, 521 total abdominal, and 255 subtotal abdominal hysterectomies. I would also like to know if any cases out of this 2,700 had a prolapse of the vagina later on.

DR. CAMPBELL (Closing).—We, as you know, have been accused at Presbyterian Hospital of doing too many vaginal hysterectomies, but we still feel that it is the method of choice whenever it is feasible, as I think the paper indicated. The original idea in trying to present this paper was that many men, as I understand from the older members of the Society, have remarked so frequently that it was perfectly fine for Dr. Heaney to do vaginal hysterectomies because he is a wonderful technician and very skilled with his hands, but that the rest of us could not do it as well. We feel that possibly one of the reasons we are able to present the results we did is, as one of the discussors said, we have been trained by the master. This is probably true, but we are still trying to train other men who will also be teachers and will teach this method which we believe our figures show is the safer procedure in the majority of cases.

Dr. Jones said they like to start their residents off with vaginal hysterectomies associated with some relaxation. This is certainly a debatable point. We still feel that most hysterectomies are easier when there is no appreciable relaxation; the more or less difficult part is that the lateral walls of the vagina fall together and obliterate the field. We agree with Dr. Jones in his statement that we do not advocate this as a cure-all or procedure to be done by the man who does not have training in vaginal surgery.

I am unable to answer Dr. Reis as to why we did not find more pelvic inflammatory disease. All I know is what the record showed.

Dr. Barrett suggested that perhaps we are advocating vaginal hysterectomy as a cure-all. I can assure him we do other things at Presbyterian Hospital besides vaginal hysterectomy. I am sorry about the use of the word prolapse.

Dr. Galloway asked about carcinoma of the cervix and of the body. We do those cases, but, as you mentioned yourself, the paper was written on vaginal hysterectomy for

benign disease of the uterus. As I recall the figures, Dr. Heaney had 77 cases of carcinoma in his 1,300 cases. I do not know what the percentage was of the cervix and of the body. In our group there were roughly 40 in which hysterectomy was done in the presence of carcinoma of the cervix or body. That would have brought out much more discussion from the floor had it been in the paper. We did not evaluate the difference in the time necessary to do a vaginal hysterectomy alone or one with additional procedures. In trying to train our residents, as stated in the paper, we do not believe that the time element is very important. Much more important is meticulous hemostasis.

I did not have any figures for anemia following vaginal hysterectomy. I do not believe that has been a complication in our series of patients. Whether or not, again, it is due to careful hemostasis, I do not know, but we are very particular in ligating small vessels.

ARRHENOBLASTOMA OF THE OVARY, WITH A REPORT OF TWO CASES

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TWO patients with arrhenoblastoma of the ovary have recently been studied in the Gynecological Department of the Johns Hopkins Hospital. Because of the extreme rarity of the condition and the paucity of 17-ketosteroid determinations on such cases, they were considered worthy of reporting in some detail.

CASE 1.—J.H.H. No. 337531. Mrs. S. F., white, aged 36 years, a private patient of Dr. Leo Brady, was first seen in November, 1944, complaining of vaginal spotting every two weeks. When 15 years of age she had noticed a fine growth of hair on the upper lip, chin, and cheeks. At about the same time her breasts began to develop, and, although this development continued normally, no menses appeared. At the age of 18 years menstruation finally began, but the interval was irregular and prolonged, varying from three to six months. The flow was scant in amount and lasted only one to two days. After marriage, at the age of 23 years, the menstrual interval decreased somewhat and varied from one to three months, but the amount and duration of the flow remained unchanged. She never became pregnant, although she never practiced contraception.

Two months before her first hospital admission slight vaginal bleeding had begun to occur about every two weeks. Because of this a dilatation and curettage was performed on Nov. 6, 1944. On examination under anesthesia it was thought that the uterus contained a small myoma. Microscopic examination of the curettings revealed early proliferative endometrium.

The spotting continued at intervals of about two weeks until April, 1945, when the menses ceased entirely. She was readmitted to the hospital on Aug. 2, 1945, and at this time physical examination showed a somewhat obese woman, 5 ft. 2¾ inches in height and weighing 165 pounds. The obesity was limited to the trunk, the arms and legs being relatively small and muscular with exceptionally well-developed gastrocnemius and quadriceps femoris muscles. There was hypertrichosis of the cheeks, lips, chin, and chest, distinct masculine distribution of the abdominal and pubic hair, and marked hypertrichosis of the lower back, buttocks, and thighs. The breasts were well developed and pendulous in type. The general physical findings were essentially negative except for a blood pressure of 176/96. On abdominal examination, an ill-defined mass could be felt in the left lower quadrant. On pelvic examination the labia majora were found to be small and the labia minora almost absent. The clitoris was not enlarged and there was no abnormality of Bartholin's or Skene's glands. The cervix was normal in size, consistency, and appearance, and pointed posteriorly. The body of the uterus was small and displaced anteriorly and toward the left by a mass in the right adnexal region. It was apparently the displaced body of the uterus which had been felt abdominally. The adnexal mass, which was about 9 cm. in diameter and irregular in contour, was freely movable, and apparently replaced the right ovary. The left ovary seemed slightly enlarged.

At operation on Aug. 3, 1945, the uterus, tubes, and left ovary appeared normal. The right ovary was replaced by a solid tumor 9 cm. in diameter. The

surface of the tumor was grossly corrugated and of a purplish brown color. There was no evidence of peritoneal metastases or implants, and exploration of the liver and retroperitoneal lymph nodes failed to reveal metastatic growth. The uterus, including the cervix, and both tubes and ovaries were removed. The patient made an uneventful recovery and was discharged on the sixteenth postoperative day. When last seen six months after operation, she was well with no evidence of recurrence.

The pathologic examination showed a normal uterus and patent tubes. The right ovary was completely replaced by a tumor measuring 11 by 8 by 8 cm. The tumor was apparently solid and well encapsulated with a smooth surface. It was yellowish gray in color, except for a small nodule on the posterior surface which was bluish and hemorrhagic. On section the tissue had a rubbery consistency and was separated into lobules by white, fibrous appearing trabeculae (Fig. 1). The left ovary measured 5 by 3 by 2 cm., and was apparently normal.

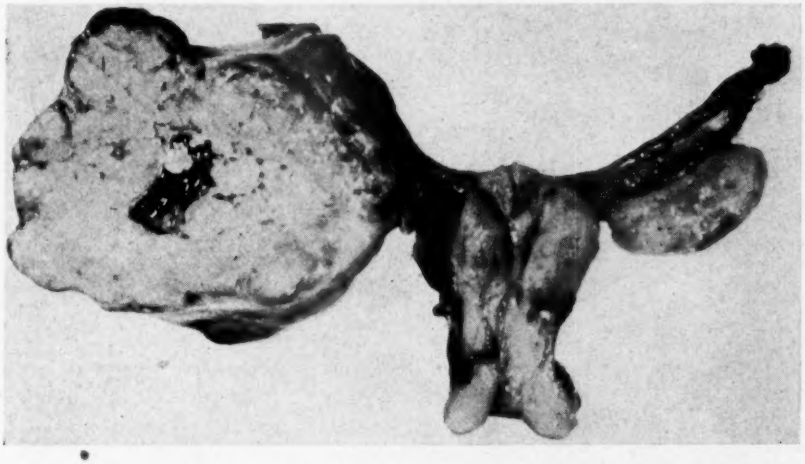

Fig. 1.—Specimen removed from patient in Case 1, showing appearance of cut surface of right arrhenoblastoma. The uterus has been opened.

Microscopically, the tumor was composed almost entirely of well-differentiated tubular elements (Figs. 2 and 3). It was necessary to search through several low-power fields before discovering any interstitial cell elements, and these then were frequently represented by single cells; such cells were easily recognized by the deeply eosin staining cytoplasm. Certain areas of the tumor might have been mistaken for a microfollicular granulosa-cell tumor.

In reviewing this case, it seems to be an arrhenoblastoma associated with relatively few masculinizing tendencies. The patient's symptoms of sexual maldevelopment, such as hirsutism, irregular menses, and sterility, date from puberty, and possibly indicate a congenital abnormality of the sex ridge with much later tumor formation. The symptoms which we believe were associated with the development of the tumor began just one year before her operation and consisted of an interruption of any menstrual rhythmicity, constant spotty bleeding, and finally, complete amenorrhea. A review of the literature shows that it is not uncommon for a patient with arrhenoblastoma to have a period of functional bleeding before developing amenorrhea; this was indeed the case in both of our patients. On physical examination the patient showed no enlargement of the clitoris which was present in our other case and is a very constant finding in those cases reported in the literature. It would seem that the paucity of masculinizing symptoms associated with the tumor growth is directly related

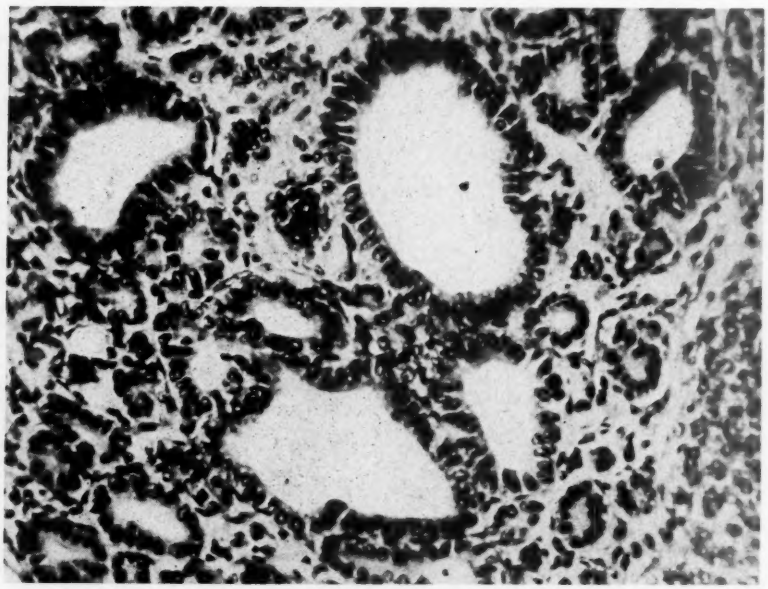

Fig. 2.—Gyn. Path. No. 63028. High-power photomicrograph of tumor from patient in Case 1, showing extremely well-developed tubules. No interstitial cells are present.

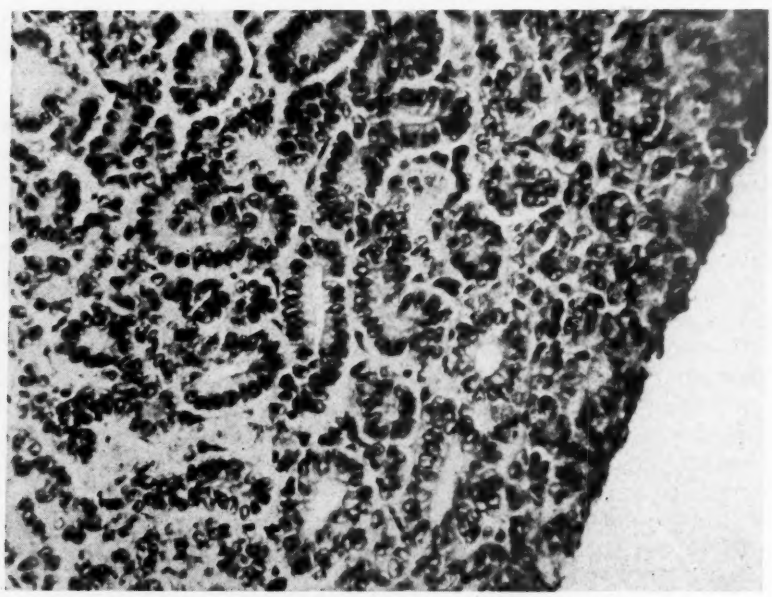

Fig. 3.—High-power photomicrograph from same tumor as Fig. 2, showing tubular development but also occasional interstitial cells, represented by the small dark-staining cells; these are deeply eosinophilic.

to the scarcity of the interstitial cell elements of the tumor as seen on microscopic examination. This fact has been found to be generally true among the Pick type of tumors.

CASE 2.—J. H. H. No. 340274. Mrs. C. B., White, aged 26 years, first consulted us on Dec. 18, 1944, complaining of menstrual irregularity of three years' duration. In the past her general health had been good, typhoid fever at the age of 9 years had been her only serious illness, and she had experienced no accidents or surgical operations. The menses had begun at 12 years of age, and until the onset of the present trouble had always been regular and painless, with an interval of about twenty-eight days, duration of four days, and average amount of flow. She had had occasional slight leucorrhea, but had never experienced urinary or digestive symptoms. She had been married two and a half years, but had not become pregnant.

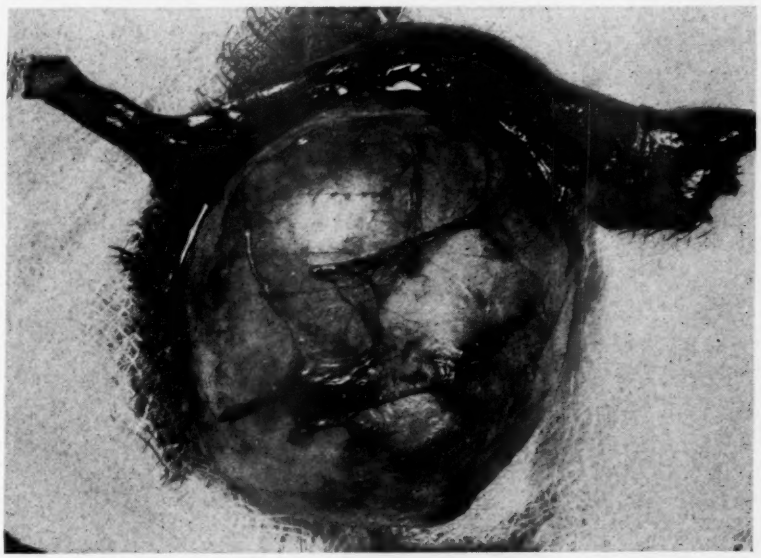

Fig. 4.—Specimen removed from patient in Case 2. Right ovarian tumor and tube.

In the patient's opinion, the onset of the condition for which she consulted us was attributed to the giving of two transfusions at an interval of only about a week three years previously. Soon after this the menstrual interval decreased to two weeks, and the duration of the flow at first increased to six days and then gradually to as long as thirteen days. She then began "to take shots" and missed first one period and then, after one normal flow, experienced amenorrhea for ten months. Following this she menstruated regularly and normally for three months, following which amenorrhea recurred and persisted for five months until she consulted us. At the onset of the menorrhagia three years previously the basal metabolic rate had been determined and she had been given thyroid extract, but she had no accurate knowledge as to the result of the metabolism test or the dosage of thyroid.

In talking with the patient, it was observable that the voice was slightly husky and that there was a little more than normal feminine facial hirsutism. The thought occurred to us that the "shots" might have been androgenic therapy, but upon careful questioning it was found that she had observed the voice change and increase in hair and was quite certain that they had antedated the "shots."

On physical examination the patient presented the appearance of a healthy young woman with normal feminine body configuration. There was a moderate amount of coarse hair on the arms, legs, and especially the face, and a small amount of pubic hair extended up to the umbilicus. The breasts were normally developed and revealed no abnormal masses and no secretion. Examination of the heart, lungs, and abdomen revealed normal findings. Scalp hair did not recede and there was no bald spot. No acne was noticed.

Pelvic examination showed normal external genitals, except for the clitoris which was definitely enlarged, being about 2 cm. long by 1.5 cm. in diameter. The outlet was marital. There was no bleeding or abnormal discharge. There was no enlargement of Bartholin's or Skene's glands. The cervix felt normal and appeared normal on speculum examination. The uterus was normal in size and in excellent anteposition. The right ovary was about two and a half times normal size, quite firm, and freely movable. The left ovary seemed a little smaller than average. Rectal examination was merely confirmatory of the vaginal palpation.

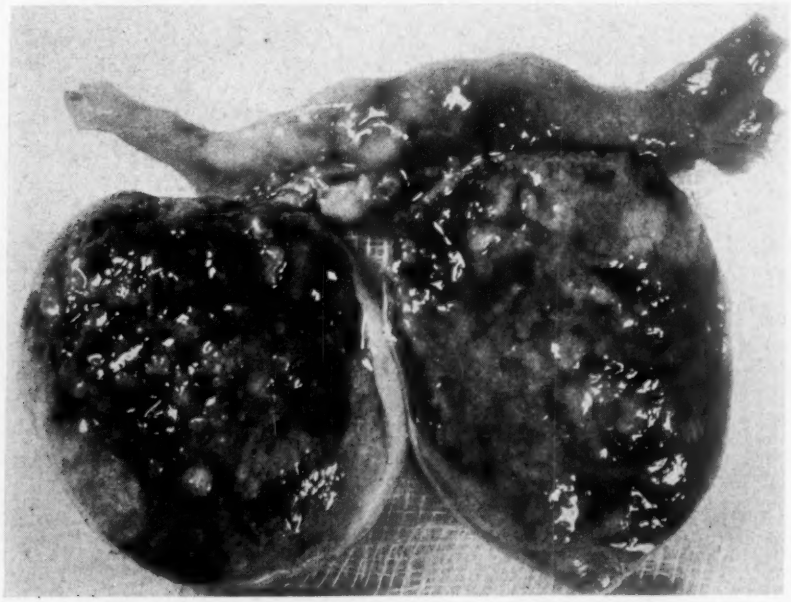

Fig. 5.—Cut surface of tumor from patient in Case 2.

The presumptive diagnosis was arrhenoblastoma of the right ovary, and the patient was admitted to the hospital on Dec. 26, 1944, where the following studies were carried out:

The hemoglobin was 14.5 Gm., and the Wassermann reaction was negative. The basal metabolic rate was plus 15 per cent, with a blood cholesterol of 227 mg. per cent. The serum chlorides were 142 meq.; blood chlorides, 99 meq.; carbon dioxide combining power, 30 meq.; and the blood sugar 78 mg. per 100 c.c. The results of a glucose tolerance test are shown in Table I. A urinary pregnanediol determination on a 48-hour specimen showed no pregnanediol to be present. Seventeen-ketosteroid examinations on two 24-hour urine specimens preoperatively showed 56 and 36 mg. per 24 hours.

Operation was performed on Jan. 2, 1945. Through a lower midline incision the pelvis was explored. The uterus and tubes were normal. The left ovary was slightly smaller than average and adherent posteriorly to the broad

ligament by filmy adhesions which were easily freed. Otherwise this ovary appeared normal. The right ovary was converted into a small spherical tumor about 5 cm. in diameter, which was also adherent to the posterior surface of the broad ligament by filmy adhesions. When these adhesions were released and the tumor brought forward, it superficially appeared to be cystic, but this appearance was found to be due to several small cysts near the surface. A right

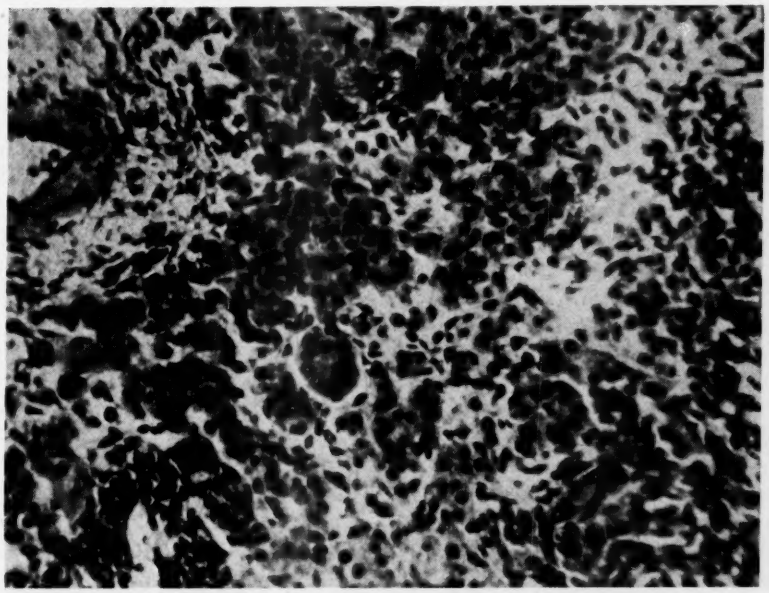

Fig. 6.—Gyn. Path. No. 61222. High-power photomicrograph of tumor from patient in Case 2 showing masses of interstitial cells.

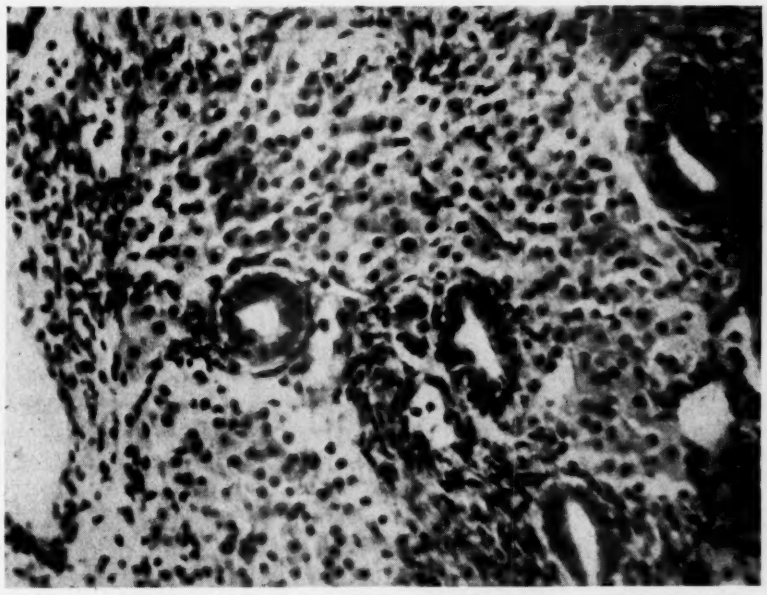

Fig. 7.—High-power photomicrograph of same tumor as Fig. 6, showing rare tubules among the interstitial cell masses.

TABLE I

TIME	BLOOD SUGAR	URINE SUGAR
½ hr.	150 mg.	0
1 hr.	75 mg.	0
2 hr.	55 mg.	0
3 hr.	73 mg.	0

salpingo-oophorectomy was done, after which the right round ligament was plicated over the area of cornual excision, and the appendix was removed.

The specimen consisted of a tube 8 cm. long which had a patent lumen and appeared to be normal. The ovary measured 3 by 3 by 4.5 cm., and was almost completely replaced by tumor. Grossly, the tumor appeared to be cystic, as it was bluish, glistening, and translucent (Fig. 4). On section, however, it was found to be a solid, well-encapsulated tumor of soft consistency with a mottled surface of yellow and reddish areas (Fig. 5). Microscopically, the tumor was composed almost entirely of interstitial cell elements; large masses of cells with eosin-staining cytoplasm and small hyperchromatic nuclei (Figs. 6 and 7). These cell masses were interspersed with areas of small spindle cells which, in certain areas of the tumor, could be seen to differentiate into tubular-like structures. Because of the relatively poor development of the tubular elements in the tumor, it has been classified as an arrhenoblastoma of the intermediate cell type.

The patient made an uneventful recovery. Urinary pregnanediol and 17-ketosteroid determinations were repeated twelve days postoperatively. The pregnanediol value remained 0 mg. per 24 hours, while the 17-ketosteroid level had fallen to 11 mg. per 24 hours.

She returned for her first follow-up visit on March 6, 1945. At this time she seemed to be in excellent health, and reported that she had had a period beginning January 28 which lasted four days, and was in every way normal except for cramps which she had not usually experienced. A second normal period had begun on February 21. There had been no regression in the hirsutism or change in the voice, but the clitoris, though still larger than normal, was definitely smaller than before operation.

The patient was last seen on Oct. 31, 1945. There was still no improvement in the hirsutism or voice, but the clitoris was only about 1 cm. in length and 7 or 8 cm. in diameter. Since her previous visit she had continued to menstruate fairly regularly, with an interval of 22 to 27 days and duration of four to five days. Since the period in January there had been no further pain.

Comment

The two cases of arrhenoblastoma of the ovary here reported presented quite different pathologic appearances and clinical histories. Case 1 had very little evidence of masculinization, except for considerable hirsutism and rather marked muscular development, symptoms which had persisted over a period of sixteen years. Complete amenorrhea had been present for a period of eight months, and this seemed to be the only symptom associated with the tumor which she was known to have had for at least a year. The microscopic picture of this tumor fitted well with the clinical findings as it was predominantly tubular, closely resembling the tubular adenoma type of Pick.

The second case had a rather acute onset of symptoms which had progressed over a three-year period. Masculinization was definite, including hirsutism, hoarseness, and enlargement of the clitoris. Amenorrhea was also present. The urinary output of 17-ketosteroids was 56 and 36 mg. per 24 hours on two different days preoperatively. Twelve days postoperatively the level had fallen to 11 mg. per 24 hours, which is within the normal range. The microscopic ap-

pearance of this tumor was quite different from that of the first case, as it consisted almost entirely of interstitial cell elements with very occasional tubule formation. The predominance of interstitial cells in the tumor correlates well with the clinical findings of virulism and elevated 17-ketosteroids. This patient had a simple salpingo-oophorectomy and when last seen ten months postoperatively, she was menstruating regularly and the enlargement of the clitoris had regressed. However, there had been no improvement in the hirsutism or voice pitch, and she had not become pregnant.

These two cases again serve to emphasize the great variability in the development of symptoms as well as the microscopic picture in cases of arrhenoblastoma of the ovary. The amount and development of the interstitial cell tissue found in the tumor correlate well with the degree and rapidity of development of the masculinization of the patient.

As the arrhenoblastoma is a biologically active tumor, it would seem that certain hormone determinations might be of academic interest. Seventeen-ketosteroid determinations with fractionation of the alpha and beta substances would be especially helpful clinically in differentiating virulization due to adrenal hyperplasia or tumor and that due to an arrhenoblastoma. There are no such assays reported in the literature. One case has been reported in which a bio-assay for androgenic substances was performed.[1] This patient was excreting 51 capon units of androgenic substances per 24 hours preoperatively. Postoperatively, the excretion fell to between 5 and 15 capon units per 24 hours. Although 51 capon units seem high for a normal female, the authors consider it to be within normal limits as the male excretion reaches 77 capon units per 24 hours. Seventeen-ketosteroid determinations have been reported as normal on one case of an arrhenoblastoma of the Pick type.[2] The same authors state that they also found a normal 17-ketosteroid excretion in another case of arrhenoblastoma, but the pathologic type is not mentioned. In our one case on which such determinations were made, the 17-ketosteroid excretion was definitely elevated preoperatively.

The question of the malignancy of the arrhenoblastoma is difficult, as there have been only about 65 cases reported to date,[3-20] and the follow-up studies on these are not too satisfactory. However, as far as can be judged from the literature, the majority of cases are benign. In view of this, a simple oophorectomy seems advisable, especially as a great many of the tumors appear in young women in whom it is desirable to preserve the childbearing function.

It is an interesting pathologic observation that the arrhenoblastoma, like the dysgerminoma, shows a predilection for the right ovary. This is in keeping with the theory of its origin from the embryonic cell rests, as the right ovary develops more slowly and less completely both embryologically and phylogenetically, the right ovary in birds being almost entirely absent.[21]

Summary

Two cases of arrhenoblastoma of the ovary have been reported. Both occurred in relatively young women and in the right ovary. One was associated with rather marked virulism, and microscopically was of the intermediate cell type. The other tumor, which was associated with only slight masculinization, was microscopically highly differentiated and resembled a tubular adenoma of Pick. The 17-ketosteroid excretion was studied in one case and proved to be elevated preoperatively, falling to normal within twelve days postoperatively. No pregnanediol was present in the urine in this case. A simple salpingo-oophorectomy was performed in one case, and the patient is well one year postoperatively with some regression of masculinization and regular menses. The other patient had a bilateral salpingo-oophorectomy and hysterectomy, and is well six months postoperatively.

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A STUDY OF 500 VAGINAL HYSTERECTOMIES

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REPORTS emanating from various gynecologic clinics have proved that vaginal hysterectomy is an operation with a very low morbidity and mortality. In many large series ranging from 600 to 2,000 cases, the percentage of mortalities has varied from 0.0 per cent to 3.2 per cent; but the majority have been a fraction of 1 per cent. The other striking features in the reports of this operation are the rarity of shock or hemorrhage, the absence of trauma to the pelvic viscera, the minimum danger of infection, the applicability of the operation to the obese and the aged, the relatively smooth postoperative course, and the absence of hernia. The incidence of thrombophlebitis and pulmonary embolus is very low, and pulmonary complications are also much less common.

The patient over 40 years of age who presents herself with a history of anomalous bleeding and who, in addition, is found to have disease of the cervix, fibroids, polyps, cystocele, and/or rectocele is an ideal subject for vaginal hysterectomy. Usually, those with cystorectocele have varying degrees of descensus of the uterus. The gynecologist is thus enabled at one sitting to remove a diseased cervix and fundus, and at the same time perform a repair of the anterior and posterior vaginal walls. Likewise, some method of urethral plication may be included in instances of associated urinary incontinence.

This paper is devoted to the study of 500 consecutive vaginal hysterectomies, with and without anterior and posterior vaginal wall repairs, performed on the gynecologic service at Beth Israel Hospital over a five-year period, from January, 1940, through 1944. A group of 14 operators took part in this work, all following a standardized fixation-ligature technique. A number of these cases were performed by three resident gynecologists who succeeded one another. The 500 cases include operations performed on private and clinic patients. It is of interest that over the same period of time an almost equal number of abdominal hysterectomies, supracervical and total, were performed.

Results

The patients varied in age from 24 to 78 years; 74.4 per cent were in the age group 36 to 50 years; 88.6 per cent of the cases were performed by a group of eight of the 14 operators. There were 12 nulliparas in the entire group; and one of these women was a virgin (Table I).

Sixty-five, or 11 per cent of the cases had had previous laparotomies; and of this group 11 were in the pelvic surgery group, including tubal gestations, oophorectomies, one salpingectomy, and one uterine suspension. There were 14 instances in which a previous vaginal plastic procedure had been performed. The details of the previous vaginal procedures were usually not known, for in practically all the cases they had been performed at another hospital (Table II).

TABLE I

AGE	DISTRIBUTION
21-25	1
26-30	3
31-35	23
36-40	110
41-45	127
46-50	135
51-55	46
56-60	25
61-65	18
66-70	9
71-75	2
76-80	1
	500

A. 14 operators performed the 500 operations
B. 74.4 per cent of the cases are in the age group 36 to 50 years
C. There were 12 nulliparas and 1 virgin

TABLE II. PREVIOUS OPERATIONS

I. Previous plastics		14
II. Previous laparotomies		65
A. Appendectomies		28
B. Cholecystectomies		14
C. Cholecystectomy and appendectomy		12
D. Pelvic operations		11
Ectopic pregnancy	5	
Ovarian cyst	4	
Uterine suspension	1	
Salpingectomy	1	

TABLE III. GROUPING OF CASES

Fibroids	227
Bleeding	252
Prolapse	162
Hypertrophy or laceration of cervix	92
Cystorectocele	226
Carcinoma	7
Sarcoma	2
Sterilization	3

A. 17 of the cases were postmenopausal
B. 6 of the fundal carcinomas were diagnosed preoperatively
C. Both sarcomas were recognized as malignancies preoperatively

Based on the preoperative clinical findings and the report of the pathologist, the cases could be grouped under the following headings:

1. Fibroids
2. Bleeding
3. Prolapse
4. Cystocele and/or rectocele
5. Hypertrophy and laceration of the cervix
6. Carcinoma
7. Sarcoma
8. Sterilization

Invariably there was a combination of two or more of these conditions which invited the decision to perform the vaginal operation. In 18 instances fibroids were the only clinical and pathologic findings. Fibroids and anomalous bleeding were the indications in 46 cases. Hypertrophy and laceration of the cervix, or cervicitis, alone were never a sole indication for the operation. The combination of prolapse and cystorectocele was the only indication in 31 cases. There were seven carcinomas of the fundus and two sarcomas of the fundus. Four of the carcinomas of the fundus had had previous radium treatment. In all these cases the patients were elderly or obese, and for that reason the vaginal procedure was selected; and, as noted above, hysterectomy was

performed as a sterilizing procedure in three cases. These patients were multiparas who, because of their medical complications, were not good operative risks for laparotomy.

There were 68 patients who had associated medical complications. Essential hypertension was most common and occurred in 52 cases. There were ten cases of diabetes, one of ulcerative colitis, one rheumatic heart disease, one diaphragmatic hernia, one of coronary artery disease, one peptic ulcer, and one of bilateral polycystic kidney disease (Table IV).

TABLE IV. ASSOCIATED DISEASES IN THESE PATIENTS

Essential hypertension	52
Diabetes	10
Ulcerative colitis	1
Rheumatic heart disease	1
Diaphragmatic hernia	1
Coronary artery disease	1
Peptic ulcer	1
Polycystic kidney disease	1

There were four types of vaginal operations performed in this series:

(a) Vaginal hysterectomy alone	144
(b) Vaginal hysterectomy and anterior colporrhaphy	11
(c) Vaginal hysterectomy and posterior colporrhaphy	103
(d) Vaginal hysterectomy and anterior and posterior colporrhaphy	242

When making studies of postoperative morbidity, surgeons have for many years been using the obstetric standard of morbidity, i.e., a rise in temperature to 100.4° F. on any two days after the day of operation. Obviously, because the work of the surgeon is so varied, it seemed unfair to accept this obstetric standard. In the present series only those cases were considered morbid where there was a rise in temperature to 100.4° F. after the fourth postoperative day. Using this standard of morbidity, it was found that 106, or 21.2 per cent, of the 500 cases were morbid.

Many of these patients were given sulfonamides as prophylaxis against urinary tract infections. Of 193 cases receiving sulfonamides, 46, or 23 per cent, were morbid. Three hundred and seven did not receive sulfonamides and, of these, 56, or 18 per cent, were morbid. One hundred and sixteen of the cases were reported by the pathologist to have had gross and microscopic cervicitis. In this group, 25, or 21 per cent, were morbid. Of the 384 cases without cervicitis, 77, or 20 per cent, also showed morbidity (Table V). One notes that there was very little influence upon the morbidity rate, despite the use of sulfonamides or the presence of cervicitis.

TABLE V. MORBIDITY

	NUMBER	NUMBER MORBID	PER CENT
All cases inclusive	500	106	21.2
Cases which received sulfonamides prophylactically	193	46	23.0
Cases not receiving sulfonamides	307	56	18.0
Cases with pathological report of Cervicitis	116	25	21.0
Cases without cervicitis	384	77	20.0

In the group where vaginal hysterectomy alone was done (144 cases), the morbidity was 19.4 per cent; vaginal hysterectomy and posterior colporrhaphy (103 cases), 15.5 per cent. Vaginal hysterectomy with anterior and posterior wall repair and vaginal hysterectomy with only anterior wall repair were combined as one group (253 cases). The latter group consisted of only 11 cases

and both had anterior wall repair in common. The morbidity in the entire group was 24.5 per cent. Oophorectomy did not have any influence on postoperative morbidity. There were 8 pelvic infections in the entire series. Three of these were pelvic abscesses. Five were bilateral parametridities (three of these were associated with cervicitis). It is of interest to note that there is a definite rise in the percentage of morbidity as soon as the anterior wall is operated upon (Table VI).

One of the disturbing postoperative complications following vaginal surgery is urinary retention. This may be due in part to compression of the urethra and vesical neck from sutures and postoperative edema, interference with the contraction mechanism because of trauma to the bladder musculature and/or nerve injury, altered position of the bladder, anesthesia, the recumbent position, and probably some psychogenic factors. One or all of these may be contributory to the cause of the retention which, in turn, greatly increases the liability to cystitis, and thus the incidence of postoperative morbidity.

TABLE VI

OPERATION	NUMBER	TEMPERATURE MORBIDITY		PELVIC POSTOPERATIVE INFECTION	WITH OOPHORECTOMY
		NUMBER	PER CENT		
Vaginal hysterectomy	144	28	19.4	2	16
Vaginal hysterectomy and posterior colporrhaphy	103	16	15.5	1	12
Vaginal hysterectomy and anterior and posterior colporrhaphy	242	60		3	17
Vaginal hysterectomy and anterior colporrhaphy	11	2	24.5	2	2

The problem of bladder difficulties was investigated first by simply ascertaining how long it took the patient to begin voiding spontaneously. In the simple vaginal hysterectomy group it was 1.3 days on the average; 1.8 days in the vaginal hysterectomy and posterior colporrhaphy group; 4.8 days in the vaginal hysterectomy, anterior and posterior colporrhaphy group; and 8 days in the vaginal hysterectomy and anterior colporrhaphy group (Table VII). Invariably, once the patient had begun to void, she voided in gradually larger and larger amounts. These patients were catheterized once daily—postmictural—for residual urine. It was a strict rule not to discharge a patient until the residual urine was less than 30 c.c. There was, of course, wide variation in all these cases, in the number of days it took before the patients began to void spontaneously.

TABLE VII

OPERATION	NUMBER	PUS IN URINE		DIFFICULTY IN VOIDING
		NUMBER	PER CENT	
Vaginal hysterectomy	144	10	6.9	1.3 days
Vaginal hysterectomy and posterior colporrhaphy	103	15	14.5	1.8 days
Vaginal hysterectomy, anterior and posterior colporrhaphy	242	42		4.8 days
Vaginal hysterectomy and anterior colporrhaphy	11	6	18.9	8.0 days

It was difficult to find strict criteria for making the diagnosis of cystitis. The picture was not constant. Urgency, frequency, and dysuria were too variable. The findings of pus cells in the urine (15 to 20 cells per high power field, with or without clumps) was therefore taken as evidence of cystitis.

Of the 500 cases, 73, or 14.6 per cent, developed pus in the urine—34 of these had received sulfonamides prophylactically.

In the group of 144 vaginal hysterectomies, 10 cases, or 6.9 per cent, developed cystitis—15 of the 103 cases of vaginal hysterectomy and posterior colporrhaphy, or 14.5 per cent, also showed pus in the urine. The large group of vaginal hysterectomy with anterior and posterior wall repair (242 cases) and the small group of vaginal hysterectomy and anterior wall repair (11 cases), were analyzed as one group. Here, 48 cases, or 18.9 per cent, developed cystitis. The evidence thus seems to point to the fact that when operation upon the anterior vaginal wall is performed, the incidence of cystitis increases (Table VII).

Simple catheterization was used in 429 of the cases. The remaining cases received either a retention catheter or tidal drainage. One hundred and ninety-three of the entire group of 500 had received sulfonamides prophylactically. There are as yet too few cases to analyze each of these groups and to evaluate the merits of each of the forms of postoperative bladder care. At the moment, however, it is an impression that careful, repeated catheterization, with administration of sulfonamides prophylactically. is the procedure of choice.

The presence of large fibroids in itself is not a contraindication to the procedure of vaginal hysterectomy. In the present series, some uteri were removed which were almost the size of a five months' gestation. Relaxation of the anterior and posterior vaginal walls, descent of the cervix, and mobility of the uterus are aids in making for the ease of vaginal extirpation of the uterus. To facilitate delivery of the uterus into the vagina, several methods can be used, namely: morcellation, amputation of the cervix, bisecting the fundus, and coring out the fundus of the uterus, as described by Lash. Caution is advocated in those instances where intraligamentous, subvesicle, and cervical fibroids are present, because these cases are associated with variations from the normal anatomic relationships of the ureters and bladder, and injuries to these organs may occur. These complications may thus contraindicate vaginal hysterectomy.

Only 85 of the entire 500 uteri removed were of normal size. Two hundred and eighty-four of them were the size of a six- to eight-week gestation, 73 the size of a ten- to eleven-week gestation, 34 the size of a three-month gestation, and 24 over the size of a three-month gestation. Thus, 58, or 11.6 per cent, were the size of a three-month gestation or over (Table VIII).

TABLE VIII

SIZE OF UTERUS				
NORMAL	6 TO 8 WEEKS	10 TO 11 WEEKS	3 MONTHS	OVER 3 MONTHS
85	284	73	34	24
				11.6%

METHOD OF TREATMENT TO FACILITATE DELIVERY OF UTERUS			
MORCELLATION	AMPUTATION OF CERVIX	CORING OUT OF UTERUS	BISECTION OF FUNDUS
47	65	12	47

Eighty-seven of the 500 uteri had some form of treatment in order to reduce their size. Forty-nine were subjected to only one of the above procedures. Thirty-eight were treated by a combination of them. Morcellation was carried out 47 times, amputation of the cervix 65 times, bisection of the fundus 47 times, coring the fundus 12 times (Table IX). Twenty-three of the 87, or 26.4 per cent, were followed by temperature morbidity, the average morbidity lasting four days. Hence the morbidity in this group compares

favorably with the group of uteri not surgically diminished in size before removal. Of the 58 uteri which were the size of a three-month gestation or over, 8, or 15.1 per cent, were followed by morbidity.

TABLE IX

A. 87 of the 500 uteri had some form of treatment in order to reduce their size, thus facilitating delivery into the vagina	
B. 49 were subjected to only one of the above procedures	
C. 38 were treated by a combination of these procedures	
D. 23 of the 87, or 26.4 per cent, were followed by temperature morbidity	
E. 58 uteri were the size of a 3 months' gestation or more; 8 of these cases, or 15.1 per cent, were morbid	
(1) 1 pelvic abscess with pelvic peritonitis	
(2) 1 case of phlebitis	

As was mentioned before, there were seven carcinomas of the fundus and two sarcomas. In all of these cases the uterus was either normal in size or only slightly enlarged, and still freely movable. The diagnosis in all was known preoperatively, and four of the carcinoma cases had had previous radium. All of these patients were either obese or in the older age group, and thus not good operative risks for abdominal surgery (Table X).

TABLE X. MALIGNANCIES

I. Carcinoma of the fundus	7
(a) 6 are still alive after 1 to 4 years	
(b) 3 were postmenopausal bleeding cases	
II. Adenoacanthoma	1 no follow-up
III. Sarcoma	2
(a) Endometrial sarcoma (Frank)	1
Despite local vaginal metastases, this patient is alive and well after 5 years; local metastases were treated with radium	
(b) Myosarcoma	1 no follow-up

Vaginal hysterectomy is contraindicated in the following instances: pelvic inflammatory disease, endometriosis with fixation of tissues, intraligamentous tumors, the presence of a large ovarian cyst, malignancy with fixation, postradiation fixation, ventral fixation of the uterus, or previous amputation of the cervix with shortening of the cardinal ligaments. Nulliparity is no contraindication, for here, once the cervix is circumcised and the pubocervical fascia cut, along with the cardinal ligaments, the uterus may be made accessible. A previous laparotomy is no contraindication, except when a gynecologic operation has been performed.

The one death in this series makes for a mortality rate of 0.2 per cent. After a somewhat morbid course terminating finally with about five days of temperature at 99° F., this patient was discharged from the hospital in apparently good condition. Soon after reaching home she had sexual intercourse. Two weeks later she presented herself again with signs and symptoms of pelvic abscess and pelvic peritonitis. She developed, despite colpotomy and intense chemotherapy, a perinephric abscess and died. There was one case of pelvic phlebitis and pulmonary infarct, three of pyelonephritis, one of transient pulmonary edema, one of transient auricular flutter, and three cases of pneumonia. Early in the series there were two instances of bladder injury. Both times the opening was promptly closed in layers. One of these patients developed a pyelonephritis. Otherwise these two cases ran the usual postoperative

course of the vaginal hysterectomy. There were no urethral injuries, injuries to the rectum, or vesicovaginal fistulae. Twice there was postoperative bleeding from the vaginal cuff, and twice from the perineum. Two of the cases have returned with symptomatic ovarian cysts which were removed. One was a simple serous cyst and the other a chocolate cyst. It is noteworthy at this point to mention the infrequency of development of ovarian cysts after vaginal hysterectomy (Table XI).

TABLE XI. COMPLICATIONS

Deaths		1
(Morbid course. Discharged 15th day. Returned 2 weeks later with pelvic abscess, pelvic peritonitis, and a perinephric abscess. Colpotomy)		
Injury to bladder		2
(Occurred early in the series. Promptly recognized and repaired. No vesicovaginal fistula)		
Vaginal abscess		1
Bleeding postoperatively		4
(a) Vaginal cuff	2	
(b) Perineum	2	
Ovarian cyst		2
(Developed after vaginal hysterectomy. These were confirmed at subsequent operation)		
(a) Serous cyst	1	
(b) Chocolate cyst	1	
Pyelonephritis		3
Pulmonary infections		3
(a) Tracheobronchitis	1	
(b) Virus pneumonia	1	
(c) Bronchopneumonia	1	
Transient pulmonary edema		1
Transient auricular flutter		1

No originality is claimed in the gross aspects of the technique of vaginal hysterectomy as performed at Beth Israel Hospital. However, the technique is a rational, methodical, and safe one; and it is easily taught. It has a definite place in the gynecologist's armamentarium and, once the technique is mastered, and as skill and experience increases, the surgeon will find himself using it more frequently.

Conclusions

1. Vaginal hysterectomy is an operation associated with a minimum of shock and hemorrhage, low morbidity, and low mortality.

2. Where hysterectomy is indicated, the vaginal approach is the procedure of choice in the obese and the aged.

3. Nulliparity is no contraindication to vaginal hysterectomy.

4. Where there are pathologic changes in the uterus and there is associated cystocele and/or rectocele, vaginal extirpation of the uterus along with plastic repair of the vagina is wisest.

5. Cervicitis, sulfonamides, oophorectomy, and age have relatively little effect on morbidity.

6. Morcellation, amputation of the cervix, bisection of the fundus, and coring out of the fundus of the uterus have been the procedures for reducing

the size of the uterus. Uteri up to the size of a three-month gestation have been removed with relative facility. Uteri the size of a four- to five-month gestation have been removed.

7. Cystitis is the commonest cause of morbidity postoperatively in vaginal hysterectomy. Difficulty in voiding disappears in the majority of cases within several days.

8. The development of ovarian cysts after vaginal hysterectomy is an uncommon complication.

9. The fixation-ligature technique is safe, and readily taught and learned.

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ONE WEST EIGHTY-SIXTH STREET

AN ANALYSIS OF 257 CASES OF STERILITY*

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THIS presentation is based on a study of 257 barren marriages, treated in the outpatient department of Mount Sinai Hospital and in the private office of Dr. Charles Mazer, during the five-year period, 1940 to 1944, inclusive.

The problem of sterility is one that confronts every obstetrician and gynecologist. Multiple etiologic factors enter into the genesis of the majority of sterile marriages. It is only through a systematic study of the sterile couple that a solution may be reached. All factors, no matter how insignificant, should be investigated. Perseverance on the part of the physician and the patient is essential. The road to success is long and has many obstacles.

Method

The following mode of study was employed. General studies included a complete physical examination, and laboratory studies, consisting of a complete blood count, urinalysis, blood Wassermann and chemistry, and cervical smears. Special studies, included the following: (1) A Hühner test, to determine whether semen is deposited, whether there is adequate invasion of the cervical canal, and whether there is any hostility of the cervical secretions. (2) A Rubin test or/and hysterosalpingography, to determine the degree of patency of the Fallopian tubes, site of obstruction, and the presence of intrauterine pathology. (3) Endocrine studies, relating to abnormalities of the menstrual cycle and anovular menstruation. These studies included endometrial biopsy, vaginal smears, estrogen determinations, and the basal body temperature.

Results

Of the 257 cases of barren marriages, 53, or 20.6 per cent, were of secondary sterility and 204, or 79.4 per cent, of primary sterility. The duration of the sterility ranged from one to twenty years, with an average of five years. The age incidence was from 20 to 39 years, with an average of 28.2 years. In 205 of the 257 cases, or 79 per cent, a combination of two or more etiologic factors coexisted.

After the patient was thoroughly investigated as to the causative factors involved, these were evaluated and therapy instituted. Adequate treatment consisted in following persistent efforts to eliminate the impediments to conception for at least one year. It was difficult to limit the span of time for adequate treatment, as patients differ, but failure within one year of continuous treatment portended a poor prognosis.

In the evaluation of the therapeutic agent employed, credit was given to the one that eliminated the major cause of the sterility. Other measures were labeled therapeutic adjuncts. Best results were obtained in the presence of a single etiologic factor. These patients, after conceiving, were treated with care usually given habitual aborters.

Seventeen, or 6.6 per cent, of the patients had gross pelvic pathology, such as large fibromyomas, ovarian cysts, and chronic salpingitis. Myomectomies were performed on four patients, three of whom conceived and carried to term. Three ovarian cysts were resected leaving portions of the ovary involved. One

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TABLE I. THE INCIDENCE OF THE ETIOLOGIC FACTORS IN 257 COUPLES WITH PRIMARY OR SECONDARY STERILITY

FACTOR	NO. OF CASES	PER CENT
I. Cervical factor	97	38
a. Inadequate invasion of cervix	66	68
b. Failure to deposit sperm	31	32
II. Tubal damage	140	54
a. Partial occlusion	90	64.3
b. Total occlusion	50	35.7
III. Endocrine factors in female	134	52
a. Amenorrhea	49	36.5
b. Metrorrhagia	3	2.3
c. Anovular menstruation	82	61.2
IV. Male infertility or absolute sterility	106	41
a. Endocrine azospermia	5	4.7
b. Obstructive azospermia	15	14.2
c. Endocrine oligozoospermia	5	4.7
d. Obstructive oligozoospermia	71	66.9
e. Necrozoospermia	10	9.5

In 205, or 79%, a combination of two or more of the four major factors coexisted.

of these became pregnant. Pelvic lesions were eliminated, when possible, before sterility studies were begun. The patients with chronic salpingitis were not studied from the standpoint of sterility.

Tubal damage was the most frequently encountered sole or associated cause of sterility. Of the 257 patients, 90 had partial and 50 had total occlusion of the Fallopian tubes, as one of two or more etiologic factors in barren marriage, for a total of 54 per cent. In 61 cases, or 23.7 per cent, tubal occlusion was the sole cause of the sterility. All patients received pelvic diathermy and estrogenic therapy for one month, and once monthly transuterine insufflations. Of 53 patients receiving repeated transuterine insufflations as one therapeutic measure, 43, or 81 per cent, conceived. Four patients conceived after one Rubin test. These were considered incidental pregnancies. Iodized oil instillations—lipiodol—were resorted to when other modes of therapy failed. Of 35 patients so treated, 12, or 34.2 per cent, conceived. One pregnancy followed removal of one tube with a plastic on the other. Of 140 patients treated for tubal occlusion, 66, or 47 per cent, conceived. Twenty-two of 50 patients with total occlusion conceived, i.e., 44 per cent, and 44 of 90 patients with partial occlusion conceived, i.e., 48 per cent.

Failure of deposition of spermatozoa by fertile mates or inadequate invasion of the cervical canal, the cervical factor in sterility, was one of two or more factors in the barrenness of 97, or 38 per cent, of the cases. The failure to deposit spermatozoa in the vicinity of the external cervical os, as determined by the Hühner test, was in most instances found to be due to faulty technique at intercourse. Premature ejaculation, redundant vaginal walls, and vaginismus were less frequently the cause for failure of deposition of the spermatozoa in the vagina. Total absence or inadequate invasion of the cervical canal, despite the presence of the usual number of spermatozoa in the posterior fornix following several hours after intercourse, was present in 66, or 69 per cent, of the cases where the cervical factor was a cause of barrenness. The most common cause of the absence of spermatozoa in the cervical canal, when an adequate number of them was present in the posterior vaginal fornix, was a pinhole external os with viscid mucus therein and intracervical polyps. The most common cause of inadequate invasion of the cervical canal was oligozoospermia and lack of vitality of the spermatozoa as determined by a properly performed semen examination.

Of the 97 patients in whom either failure of deposition of the semen or lack of invasion of the cervical canal was a contributing cause 73, or 75 per cent, conceived, following treatment of the several factors involved. The treatment of inadequate invasion of the cervical canal consisted of the removal of obstructive agents, such as pinhole os, cervical polyps, and viscid cervical secretions. Twenty-six patients, or 39 per cent, conceived following this form of therapy. Precoital alkaline vaginal douches or Nutrisal were employed in instances of oligozoospermia and partial necrozoospermia in the hope of maintaining the vitality of the spermatozoa deposited in the posterior vaginal fornix. Homologous insemination of the cervix was employed when all other measures failed. It was successful in the single case employed.

Of 134 patients that showed endocrine menstrual disturbances, alone or in combination with other causes, 54, or 42 per cent, conceived following therapy, toward elimination of this and other causes of the barren marriage. The following menstrual disturbances were found: amenorrhea, menometrorrhagia, and anovular menstruation.

Of 49 patients treated for amenorrhea 29, or 59.1 per cent, conceived. Low dosage irradiation to the pituitary and ovary was the most effective form of therapy. Of 32 cases so treated, 28, or 87.5 per cent, conceived. Therapeutic adjunct included small doses of thyroid, regardless of the basal metabolism rate, correction of faulty diet, insulin for the underweight, and removal of foci of infection.

Of three patients treated for menometrorrhagia, one conceived following dilatation and curettage followed by chorionic gonadotropin.

TABLE II. ANALYSIS OF ADEQUATE TREATMENT IN 257 COUPLES WITH PRIMARY AND SECONDARY STERILITY

PRESUMED ETIOLOGIC FACTOR	NO. OF PATIENTS TREATED	MOST IMPORTANT THERAPEUTIC AGENTS USED	THERAPEUTIC ADJUNCTS	NO. OF PREGNANCIES
I. *Cervical Factor*	97			73
a. Inadequate invasion of cervix		Dilatation and cauterization of cervix. Homologous insemination	Precoital alkaline douche. Treatment of male	
b. Failure to deposit sperm		Vaginismus operation	Treatment of male	
II. *Tubal Factor*	140			66
		Repeated transuterine insufflation	Diathermy, estrogen thyroid. Cauterization of cervix. Treatment of male	
		Lipiodol instillations in uterus		
III. *Endocrine Factor*	134			54
a. Amenorrhea	49	Low dosage irradiation	Desiccated thyroid —all. Treatment of male. Equine gonadotropin	29
b. Metrorrhagia	3	Curettage. Chorionic gonadotropin	Desiccated thyroid	1
c. Anovular menstruation	82	Equine gonadotropin. Synapoidin. Equine and chorionic gonadotropin	Desiccated thyroid	41
IV. *Male Infertility*	106			68
a. Azospermia	20	Combinations of pituitary, equine, and chorionic gonadotropin	Thyroid and massage of prostate	
b. Oligozoospermia	86	Pituitary and equine gonadotropin	Thyroid and precoital alkaline douches	

Of 82 cases treated for anovular menstruation 41, or 50 per cent, conceived. Thirty-four patients received equine gonadotropin; 15, or 44 per cent, of these conceived, one of these aborted. Of 19 patients treated with Synapoidin, 12, or 63 per cent, conceived, and one of these aborted. Of 29 patients receiving pregnant mare serum plus chorionic gonadotropin, 14, or 48.2 per cent, conceived.

In 106, or 41 per cent of the cases, the husband was partly or wholly at fault for the sterility. Of these, 68, or 64.1 per cent, conceived following therapy of the husband simultaneously with treatment of his mate for conditions unrelated to the low degree of fertility of the husband. Absolute sterility in the male was rare, it was found in only ten cases, i.e., 9.4 per cent. Eighty-six cases, or 81.1 per cent, had oligozoospermia and varying degrees of necrozoospermia. In ten, or 9.4 per cent, of the cases an endocrine dysfunction was found in the male. An urologist treated all males.

Of the 257 cases studied, 129, or 50 per cent, conceived following therapy. There were seven abortions and one ectopic. There were no stillbirths or neonatal deaths.

TABLE III. RESULTS IN PRIMARY AND SECONDARY STERILITY

NUMBER OF PATIENTS	PRIMARY STERILITY	SECONDARY STERILITY	AGE INCIDENCE	AVERAGE DURATION OF STERILITY	NUMBER OF PREGNANCIES	PER CENT OF PREGNANCIES
257	204	53	28.2 yr.	5 yr.	129	50

TABLE IV. TERMINATION OF THE 129 PREGNANCIES

	NUMBER	PER CENT
Living infants	122	93.8
Spontaneous abortions	7	5.4
Ectopic pregnancies	1	0.8
Stillbirths	0	
Neonatal deaths	0	

Summary

In conclusion, several interesting features may be pointed out. One patient conceived and delivered after one ectopic pregnancy. One pregnancy followed the removal of one tube with a plastic on the other. One homologous insemination was attempted with success. One pregnancy resulted from four heterologous inseminations. Of prime interest was the use of lipiodol as a therapeutic agent for occluded tubes. Out of 35 patients so treated, 12 conceived. Of 32 patients treated for amenorrhea with x-ray to the pituitary and ovary, 28 conceived. Thirty-four patients were treated with pregnant mares serum for anovular menstruation. Fifteen of these conceived. Synapoidin was used in 19 cases, 12 pregnancies followed.

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Discussion

DR. ARTHUR FIRST.—This is a statistical paper and it is difficult to discuss a statistical paper without quoting more statistics. One becomes confused by the many figures and percentages and in the resultant haze may miss the essence which is that thorough treatment of many factors in sterility plus persistence in treatment over one year, plus careful antiabortion therapy after a patient finally conceives, yields the best results.

Dr. Winson finds that 20 per cent of his sterile patients had been pregnant previously. It is with the remaining 80 per cent that the most difficult problems are encountered. He divides his cases into four etiologic factors, namely, the male factor, the cervical factor, the tubal factor, and the endocrine factor.

As to the male factor, the husband was responsible in 40 per cent, which is the usual figure quoted. It would be interesting to know how many of those became pregnant following treatment to the male only. My own experience has been rather disappointing from the standpoint of improvement in sperm count and of male fertility in spite of thyroid, vitamin E, amino acids, and hormone injections. Massage of the prostate and seminal vesicles, thus getting rid of pus in the prostatic secretion, seems to be our most effective agent at present.

As to the cervical factor, Dr. Winson mentions precoital alkaline vaginal douches or so-called nutrisal. In our experience the addition of this Ringer's glucose solution has meant little. Dr. Winson mentions one case of homologous insemination resulting in pregnancy. We have used this form of treatment for over ten years where there is a question of faulty insemination. I put the entire semen from the husband in a diaphragm and this is placed against the cervix for twenty-four hours on three different occasions during the fertile period. Our results are encouraging.

As to the tubal factor, the 24 per cent tubal occlusion noted as the sole cause of sterility runs much lower than that obtained in a hospital sterility clinic. At our sterility clinic at Jefferson Medical College, over 60 per cent of the patients have completely blocked tubes. Of interest is the value of lipiodal injection as a therapeutic measure. Twelve out of 35 patients becoming pregnant is certainly an excellent percentage. From personal experience, however, I would recommend that this procedure be employed only in the hospital; as on several occasions where I have allowed the patient to go home immediately, she suffered a violent attack of pain a few hours subsequently which was relieved only with morphine.

As to the endocrine factor, the best results obtained by Dr. Mazer were with low dosage irradiation of the pituitary gland for amenorrhea and employing practically all the gonadotropic and ovarian hormones in the pharmacopeia for the other forms of endocrine sterility. Dr. Mazer employs very large and expensive dosages of these hormones which I think accounts for his unusually high degree of success, namely, 54 per cent.

In conclusion, I would like to say that Dr. Mazer and Dr. Winson are to be congratulated on their excellent average of 129 pregnancies out of 257 sterile women. However, I think more practical information could be obtained from this paper if typical case histories were summarized in table form with dosages, etc., rather than giving us an over-all picture of figures and percentages.

SADDLE BLOCK ANESTHESIA WITH NUPERCAINE IN OBSTETRICS

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THE term, saddle block, is applied to a form of low spinal anesthesia confined exclusively to the perineal area. The technique for its induction has been described by both British and American writers. Pitkin, in 1928,[1] appears to be the first American writer who described a technique for producing this distribution of anesthesia. The block is ideal for perineal and rectal surgery. However, it failed to gain widespread popularity because the anesthesia did not remain localized in the originally intended spinal segments but spread over a more extensive area. This difficulty has been overcome by adding glucose to the solution of the drug.[2] Apparently, the glucose inhibits diffusion and, in addition, causes the solution to be hyperbaric or heavier than spinal fluid. When injected into the subarachnoid space with the patient in the sitting position, the solution gravitates downward and the drug becomes concentrated in the conus of the dural sac. Exact localization of anesthesia is thus possible. One desirable feature of the block, particularly from the standpoint of obstetrics, is that the distribution of anesthesia may be modified by varying the time the patient remains in the sitting position after injection. Thus, one can, by certain manipulations, obtain complete loss of sensation in the perineum and relaxation of the perineal muscles and hypalgesia and analgesia over the legs and thighs without paralysis of the thigh and leg muscles. This distribution of anesthesia is desirable when the lithotomy position is indicated. In addition, the sensory fibers to the uterus are affected and the pain of labor is abolished. This distribution of anesthesia and analgesia resembles, in many ways, that distribution obtained by peridural (caudal) injection of local anesthetic drugs. Inasmuch as saddle block is merely a specialized form of a subarachnoid block, its induction is simpler, safer, and more precise than that of a caudal block.

Heretofore, spinal anesthesia has been of limited value in obstetrics. One reason for the lack of enthusiasm has been that procaine has been the drug of choice. It is necessary to repeat the block frequently for analgesia early in labor when procaine and drugs of similar duration of action are used. The longer-acting and more potent drugs, such as pontocaine and nupercaine, have extended the usefulness of spinal anesthesia by the single injection method. Nupercaine, which possesses a duration of action ranging from three to five hours, has been used by certain workers for general surgery. Cosgrove[3] used it for obstetric anesthesia in 1930 but obtained unsatisfactory results. The extent of anesthesia was difficult to control, and he noted a high incidence of nausea, vomiting, and postlumbar puncture headaches. His experience, however, is not in accord with that of other workers using nupercaine. Jones,[4] Whitacre, and

Sankey,[5] Silverton,[6] Wilson,[7] and many other American and British workers have employed the drug with a high degree of satisfaction in all types of surgical procedures. Roman and Adriani[8] simplified the technique for using nupercaine for general surgery by mixing it with glucose and now use the drug for all lengthy operations at the Charity Hospital at New Orleans. Likewise, they have obtained a high degree of satisfaction with saddle block for rectal, urologic, and gynecologic surgery in which nupercaine was the drug of choice. There appeared to be no reason why saddle block using nupercaine could not be applied to obstetrics.

This is a report of a detailed study of its use for analgesia during labor and anesthesia for delivery in 136 obstetric patients.

Technique

The materials for performing a saddle block are those usually employed in spinal anesthesia—a wheal needle, a 20 guage short bevel spinal needle, and several 2 c.c. syringes. Glucose, 10 per cent, prepared in physiologic saline or distilled water, a 1/200 solution of nupercaine, and 1 per cent procaine for infiltration are the necessary solutions and drugs.

Two and one-half mg. of nupercaine (½ c.c. of 1/200 solution) is thoroughly mixed with ½ c.c. of glucose solution and set aside in a 2 c.c. syringe. No spinal fluid is necessary in the preparation of the solution. It is preferable to prepare the solution before the lumbar puncture is performed to avert failures due to dislodgement of the needle by unexpected movements of the patient. The puncture must be performed with the patient in the sitting position. The puncture is simplified if the patient sits in the center of the delivery table or at the edge of the bed with the arms folded across the chest. She should lean forward with her shoulders supported by an assistant. An intradermal wheal is raised at the fourth lumbar interspace and the interspinous tissues are infiltrated with 1 per cent procaine. The third interspace may be employed if the fourth is not accessible. The use of the higher interspace does not appear to cause any appreciable difference in the extent of anesthesia. When spinal fluid flows freely the syringe containing the solution is attached to the needle and aspiration is attempted. A free flow of spinal fluid must be obtained to assure correct placement of the bevel of the needle in the subarachnoid space. In executing the maneuver, one should aspirate as little spinal fluid as possible (not more than ⅒ c.c.), otherwise dilution occurs which interferes when obtaining the desired distribution of anesthesia. The needle should be readjusted until a satisfactory flow is obtained if the spinal fluid does not flow freely. Most failures in spinal anesthesia are due to unsatisfactory lumbar puncture. The solution is injected as rapidly as gentle pressure upon the plunger of the syringe permits. The total time for completion of the injection is approximately two seconds. If the drug is injected slowly, the distribution of anesthesia will not be satisfactory. The needle is then withdrawn from the spinal canal and the patient is allowed to remain in the upright sitting position for thirty seconds, after which time she is placed in the recumbent position. This timing is particularly important and should be done by the clock. It is advisable to support the head on a pillow for at least fifteen minutes. The solution should not be introduced during a contraction because the spinal fluid pressure is increased at this time. Currents established in the subarachnoid space force the drug into the thoracic region and give greater distribution of anesthesia and halt labor. The patient must not move or shift about for five or ten minutes after completion of the injection. The straining, which may accompany such movements, also causes spreading of the drug in the spinal canal.

The sensory and autonomic fibers of a mixed nerve are more sensitive to the effects of a local anesthetic drug than the motor. When the patient is promptly restored to the recumbent position, a 2½ mg. dose becomes distributed over a greater number of segments than if she sits up thirty seconds. The lumbar segments, however, are exposed to a more dilute solution than the sacral. The degree of anesthesia decreases as one ascends the cord. Still, the concentration of drug is sufficient to produce anesthesia and paralysis of the legs, thighs, and hypogastric areas in most cases. The sacral segments are exposed to a more concentrated solution of drug than the lumbar so that both motor and sensory fibers are profoundly affected. The perineal area, therefore, is completely relaxed. When the patient sits up thirty seconds, a greater concentration of drug localizes in the conus than in the former case. Anesthesia of the vulva and other perineal structures, likewise, is complete. The concentration of drug along the lumbar segments is less and, as a rule, insufficient to block completely all the sensory fibers in these segments. Hypalgesia and disseminated areas of analgesia are present in the legs and thighs. Little or no paresis of the leg and thigh muscle is obtained. The analgesia over the thighs gradually merges into an area of hypalgesia over the lower abdomen, sometimes as far as the umbilicus. However, the concentration of the drug is sufficient to block the sensory fibers to the cervix and uterus. The sensory fibers to the cervix and lower uterine segments are derived from the sacral and lower lumbar spinal nerves, those of the upper part and the fundus from the upper lumbar and twelfth thoracic segments. The motor innervation of the uterus is still a matter of question. It is believed that the motor fibers are derived from the lower thoracic segments. Consequently, there is no diminution in the number or force of the contractions unless the drug extends into the thoracic region. The recti are not affected and the patient can bear down if requested. The patient will not bear down unless told to do so, however, as the analgesia causes her to be unaware of the contractions.

Method of Study

The writers have been interested primarily in the applicability of the block to obstetrics. Therefore, in order to exclude all complicating factors, its use was limited exclusively to normal primiparas or multiparas. Patients presenting systemic abnormalities or obstetric complications were excluded. Sedation, likewise, was omitted in the first 100 patients. The block was performed after the inception of the first stage of labor. Usually, the contractions appeared at 3- to 4-minute intervals and the cervix was 5 to 6 cm. dilated and approximately 60 to 80 per cent effaced. Blood pressure and pulse rate were observed at 3- to 4-minute intervals, shortly after induction of analgesia, and at 10- to 15-minute intervals after the first thirty minutes. The anesthetist remained in constant attendance in all cases, closely observing the frequency and intensity of contractions, fetal heart tones, progress of labor, respiration, and other reactions of the patient. Emphasis cannot be placed too strongly upon the fact, in this procedure as in other forms of subarachnoid anesthesia, that the patient may not be left unattended until ready for delivery. In approximately half the cases, analgesia was induced in the patient's bed. In the remaining cases, the block was induced in the delivery room, and the patients remained on the delivery table throughout labor. An anesthesia machine was in readiness for the administration of oxygen or artificial respiration or analgesia in the event that the block failed. Vasopressor drugs for overcoming hypotension were held in readiness as is the usual custom in all cases of spinal anesthesia. A second tray with drugs and needles was available for repeating the block for cases in which labor outlasted analgesia. In instances in which the block was repeated, the procedure was exactly as in the first block.

Results

Satisfactory analgesia during labor and anesthesia at the time of delivery were obtained in the majority of cases. The average duration of analgesia was three hours. In some cases, the block lasted as long as five hours. In the majority of cases the pain of uterine contractions returned in three hours, but the perineum was still anesthetized. Eighty-one per cent of the patients obtained complete pain relief during labor and delivery. Fourteen per cent complained of slight pain in the upper abdomen upon application of forceps and a dragging sensation during the period of traction. In others, the traction caused a dull ache in the epigastrium or along the back in the lumbar region. No pain was felt in the perineum at this time or during repair of the episiotomy. Inhalation of analgesic mixtures of nitrous oxide-oxygen until the head was delivered obliterates this most satisfactorily. Surgical anesthesia with the gas with loss of consciousness is not necessary. In 5 per cent of the cases the block was not satisfactory. Pain in the perineum or back due to poor distribution of analgesia resulted. Pain from uterine contractions, likewise, was not relieved. The failure, it was felt, was due to some error in technique. It is imperative that timing and measurements of volume of solutions be precise to insure success. The block was repeated after fifteen minutes and satisfactory analgesia was obtained the second time in every case. There is no objection to, or danger in, repeating the block in the event of failure because the doses of nupercaine employed are small.

The patients were comfortable and cooperative throughout the labor and delivery. Patients in pain or who were not cooperative before the block was performed invariably became quiet and cooperative as soon as analgesia was established. The absence of paralysis of the extremities permitted the patient to move about in bed and shift to comfortable positions. The hypotension and other circulatory changes caused by postural changes when extensive anesthesia is obtained by subarachnoid block were not present in these patients. The analgesia in the legs and thighs averts the discomfort usually experienced when the lithotomy position is instituted during the delivery. Seventy per cent of the patients were delivered by aid of low forceps and episiotomy. Anesthesia for repair of episiotomy was satisfactorily obtained in every single instance. A single block was sufficient in 68 per cent of cases. In 32 per cent, labor outlasted analgesia and repeated blocks were necessary. The shortest time from the institution of analgesia until delivery was fifteen minutes; the longest was eleven hours and fifty-one minutes. In the latter case, three blocks were performed. No difference was noted in the third stage of labor if compared with cases delivered with other types of analgesia or anesthesia. Postpartum hemorrhage was not encountered, nor was excessive bleeding a problem. The babies cried spontaneously and none required resuscitation.

Nausea and vomiting occurred in 13 per cent of the cases. It was a troublesome complication when the patient accepted food or fluids during labor. It was encountered early in the series until the fact was recognized. It is advisable to restrict fluids and food during labor. A lowering of blood pressure averaging 10 mm. systolic occurred in 50 per cent of the cases. The reduction was attributed to removal of psychic effects on blood pressure by the pain relief. In the other 50 per cent there was a momentary fall in systolic pressure, sometimes as low a level as 80 mm. Hg shortly after completion of the injection. Recovery was, however, immediate. No therapy other than deep breathing was required. This drop in pressure must not be confused with the hypotension with bradycardia which is frequently seen with spinal anesthesia, particularly in the more extensive blocks. This type of circulatory disturbance was notably absent, save in three cases. In these, the blood pressure dropped to 80 and 90 mm. Hg and remained at this level. It was, however, quickly restored by

ephedrine (15 to 30 mg.) intravenously. The number of spinal segments affected in saddle block is few, and the motor anesthesia is confined to a few small muscles. Physiologic changes, therefore, are less extensive and profound than in "high" spinal anesthesia.

Respiratory depression or embarrassment was not encountered in any case. Rectal or urinary incontinence during labor was not observed. Hysterographic and other studies of the effects of the block upon labor were not attempted. No remarkable effect upon the duration of labor was apparent, however.

Postspinal headache, although not encountered in any case in this series, is the one complication which could limit the usefulness of the block. Backache, urinary retention, distention, ileus, meningismus, palsies, or other complications were, likewise, absent.

Comment

Obviously, 136 cases is not a sufficient number to prove the merits or demerits of any method of analgesia or anesthesia. However, the number is sufficient to show the applicability of saddle block to obstetrics. Although the results were gratifying and untoward reactions were not encountered either during labor or delivery, one must bear in mind that the usual hazards and complications of spinal anesthesia may occur with this method as with others. The absence of headache, palsies, urinary retention, and other sequelae of spinal anesthesia in a series as small as this obviously is of no significance. Likewise, it must be emphasized that these were normal cases, free from complications. The applicability of this method of analgesia to other than uncomplicated obstetric cases requires further detailed study of a large series of cases. When spinal anesthesia is desired and not contraindicated, certainly, this is the technique of choice.

Saddle block anesthesia with nupercaine offers many advantages over the continuous caudal technique. The uncertainty of locating the caudal canal, the presence of the indwelling needles and catheters, the repeated use of relatively large amounts of local anesthetic drugs, and the uncertainty of distribution of anesthesia are undesirable features which are eliminated by saddle block.

Summary

Saddle block anesthesia is a form of low spinal anesthesia distributed chiefly to the perineal area. A technique is described for producing prolonged anesthesia and analgesia by using nupercaine. The block was used in 136 normal cases with gratifying results. The ease and simplicity of induction, the safety allowed by the low dosage of drug, and the exact localization of the distribution of anesthesia make the use of this block the technique of choice where spinal anesthesia is preferred or desired in obstetrics. The method is worthy of further use and clinical trial.

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ADDITION OF PENICILLIN SODIUM TO ANESTHETIC AGENT FOR LOCAL INFILTRATION ANESTHESIA

Preliminary Report

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SODIUM penicillin is widely used, and its effectiveness in certain conditions and on certain organisms by different methods of administration is becoming more clearly defined. Considerably less attention has been given to its prophylactic use. This is a preliminary report on the addition of 250 Oxford Units of penicillin sodium to each cubic centimeter of anesthetic agent used in local infiltration anesthesia for repairs of incisions and lacerations of the vulvo-vagino-perineal areas sustained during parturition.

In reviewing the first 208 consecutive deliveries of a newly established obstetric department, 169 repairs were made immediately following delivery, of which 116 were under a local infiltration anesthetic and 53 were under an inhalation anesthetic. The results of seven repairs were unsatisfactory (two inhalation, five local). Twenty more were "disturbing" but not unsatisfactory (two inhalation, eighteen local).

The seven unsatisfactory results consisted of: three complete disruptions necessitating secondary repairs, one fistulous tract, and three partial disruptions, the latter causing anatomic and functional defects of the introitus. In two of the complete disruptions there was associated persistent coughing caused by a severe asthmatic attack in one and a partial atelectasis in another. There was no associated pathology in the third. An endometritis of a mild type occurred in two of the partial disruptions.

By "disturbing" results, reference is made to the repair that developed redness and edema within 24 to 48 hours, followed in two or three days by a separation of the skin edges, usually at the outer angle, and frequently extending into the deeper structures, with the sutures noticeably intact. This wound developed some sloughing and sluggish healing which necessitated measures that would encourage the healing from the gutter outward. In these there were no functional defects of the introitus, and anatomic disturbance was slight, if any. There were only three associated conditions such as endometritis, mastitis, and anemia in these twenty cases.

The 169 repairs were analyzed as to location of repair, type of suture used, type of delivery, hours of labor, and associated complications. Beyond the above complications sufficient variation could not be noted to warrant mentioning.

Dissatisfaction over the 27 above mentioned cases prompted investigation along the following lines. Cultures were taken of the sutures, sterile goods, noses and throats of personnel. The technique of the handling of the patient intrapartum and postpartum was reviewed and checked. The methods of repair and handling of tissue were studied. It was reasoned that, because of the edema, redness, and slough with intact suture, there must be a combination of impaired circulation and infection.

To eliminate one factor, infection, the use of penicillin was considered. Bentley[1] reported a 95 per cent primary healing from use of penicillin locally with early secondary suture of flesh wounds. Brown[2] reported much the same results. Lamon and Alexander[3] closed decubitus ulcers and secured primary healing by intramuscular and local injection of 250 units of penicillin per cubic

centimeter. Lundy and Osterberg,[4] Shannon and Zielinski,[5] and others have reported neither the antibacterial activity effect of penicillin is impaired in the presence of procaine hydrochloride or metycaine, nor is the effect of the anesthetic agent impaired in the presence of penicillin. These encouraging facts prompted the addition of penicillin sodium to the local anesthetic in a series of cases.

Method

No change was made in intrapartum or postpartum care, suture material, or methods of repair. For 81 consecutive repairs of incisions or lacerations a local infiltration was made of 1 per cent procaine hydrochloride in normal saline to which 250 units of freshly made penicillin sodium were added to each cubic centimeter of the solution. This mixture was made fresh at the time of each delivery.

An average of 45 c.c. was injected into the subcutaneous, intramuscular, and submucosal vulvo-vagino-perineal area by infiltration. In two patients pudendal nerve blocks were effected with 15 c.c. injected bilaterally into Alcock's canal area.

The patients were prepared for delivery by scrubbing the abdominal, pubic, thigh, vulvar, and rectal areas with liquid green soap with the gloved hand followed by removing with sterile water and spraying with merthiolate. Before the repair was done, the towel drapes were replaced, the anal drape was secured with clips, and the gloved hands were washed with green soap.

Postpartum attention to the repair consisted of: douching vulvoperineal area with 1-2000 bichloride of mercury, cotton ball cleansing being used as indicated; spraying twice daily with merthiolate, and applying the vulvar pad which was held in place with a sanitary belt. T-binders were not used.

Results

Forty-four delivered spontaneously; 31 were delivered by outlet forceps; four were delivered by midforceps extraction; and two were delivered as assisted breech. In the management of these, 49 right mediolateral, two left mediolateral, and 23 median episiotomies were performed. Six patients sustained lacerations of a first or second degree. Thirty patients were repaired with No. 00 chromic catgut suture, 49 with No. 0 chromic catgut suture, and two with No. 1 chromic catgut and dermal sutures. In all but four the skin edges were approximated with a subcuticular stitch.

In 77 the results of the repairs were considered excellent. Three of the four remaining were excellent except for one centimeter shallow separations of the skin only at the distal angle. These separations showed no redness, edema, or slough, and were healed by the fourteenth postpartum day. The fourth repair must be considered less satisfactory, as a large submucosal hematoma developed in the episiotomy area and extended the length of the vagina. The hematoma was evacuated on the seventh postpartum day, and the patient made an uneventful nonmorbid recovery. The area showed no evidence of infection at any time. These four occurred in right mediolateral episiotomies repaired with No. 0 chromic catgut suture used as a subcuticular stitch.

Associated complications in the puerperium were six cases of mild acute mastitis, two cases of mild endometritis, two postpartum hemorrhages, and one intrapartum hemorrhage from an anterolateral vaginal wall laceration. None of these seemed to influence the course of the repairs. In seven patients there was evidence of extravasation of blood into the submucosal and subcutaneous tissues at the sites of injections. Clinically and subjectively there was no further disturbance. (It was noted this followed the use of one particular manufacturer's penicillin. No further reactions occurred on change to another brand.)

There was some increased discomfort to the actual injection of the local infiltration with the penicillin added solution in about 50 per cent of the cases but this varied with the degree of analgesia and anmesia present. In the remainder of the post-partum course there was not only a general tendency for these patients to have less subjective symptoms referrable to the perineum, but objectively the repairs were remarkably free of swelling, redness or discoloration other than described above.

The postpartum checkups at six and twelve weeks clinically presented repair areas of less scar tissue, less tenderness, and more normal elastic properties.

Comment

Search of medical literature and communications with some outstanding pharmaceutical concerns fail to reveal any previous use of penicillin prophylactically in local anesthetics for obstetric or gynecologic surgery. In the large, well-equipped, adequately staffed maternities, the need for additional protection from infection of repairs possibly does not exist. But the smaller obstetric services of many general hospitals, with minimum facilities and always present personnel problems may find this need.

The site of the surgical field is not only more difficult to prepare, but asepsis is most difficult to maintain in many cases. It is therefore not unreasonable to feel that the repair is potentially infected and that bacteria are being carried into the area with the infiltrating and surgical needles.

Also, some temporary circulatory impairment of the operative area is produced by the chemical and mechanical effects of the local infiltration. This may offer an advantage to pathogenic invading organisms. The penicillin was added to inhibit the bacterial growth during this temporary impairment, i.e., until normal physiologic defense is re-established.

One possible disadvantage in the use of penicillin in this manner is that of sensitizing the patient to further penicillin therapy. If a complication developed that would respond to such therapy, but sensitization prevented its use, a most unfortunate problem might be at hand. However, the seriousness of this potential disadvantage is certainly in a controversial state.

A diversity of reactions to penicillin has been reported, most of which have been systemic effects, whether administered parenterally or locally. Cormia, Jacobsen, and Smith[6] reported serious reactions but no deaths in 0.5 per cent of 2,000 patients treated with penicillin. Jadassohn et al.,[9] Graves, Carpenter, and Unangst[10] further found previous fungus disease and impurities in the brand increased the possibilities of reactions. Welch and Rostenberg[7] reported very low incidence of reactions to crystalline penicillin. However, the mechanism of reactions to penicillin has not been determined.

Only a small percentage of the sensitizations reported follow initial or small doses of penicillin. Lyons[8] claims sensitization is transient and that therapy can usually be continued. Cormia and his associates[6] disagreed. They found the sensitivity to extend for as long as three or more months and that therapy had to be discontinued. None of the patients in this report received further penicillin therapy than that infiltrated. No reactions were encountered other than the seven cases showing subcutaneous extravasation of blood which ceased to occur on change to another manufacturer's product.

Inasmuch as the per cent of reactions to initial administrations of brands free of impurities is small and the clinical results of these repairs are so markedly improved, one cannot help but encourage further study. The gratifying results were obtained in face of increased distressing personnel problems on this service.

Further study should include more bacteriologic investigation and probably a variation of dosage, such as 50, 100, 150, and 200 units per cubic centimeter. The addition of penicillin to the local anesthetics used for major and minor vaginal surgery is anticipated.

Summary

1. Penicillin sodium, 250 units, was added to each cubic centimeter of local anesthetic agent for repairs of lacerations or incisions of the birth canal in 81 cases.

2. Sufficiently encouraging improvement occurred in repairs to urge further study.

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PSYCHONEUROTIC SYMPTOMS FOLLOWING HYSTERECTOMY

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DURING the past few years I have been strongly impressed by the effects of hysterectomy on neurotics. After surgical intervention some of these women claim that they have new symptoms. There are three outstanding factors about their postoperative reactions.

First, even though such a patient is highly intelligent, she does not tell the physician about her "new" symptoms. Indeed, extensive follow-up studies made by critical and experienced gynecologists fail to mention any observation corresponding to the material presented below. Authors who have given meticulous care to hundreds of consecutive hysterectomies are unaware of these changes in their patients' emotional states.

Second, the patient has an attitude toward the gynecologist who performed the operation which is different from her attitude toward the psychiatrist to whom she spontaneously presents an abundance of facts which she would never think of telling to the gynecologist. In her reticence toward the the operator the patient may impulsively, in accordance with the main patterns of her neurosis, condemn him or protect his reputation.

Third, it is my impression that the indication for hysterectomy has an important bearing upon the patient's postoperative reaction. One of my patients who had a hysterectomy for a suspected ovarian malignancy, and another who underwent the same operation for a perforation of the uterus during abortion, showed effects different from those manifested by neurotics in whom the uterus was totally or subtotally removed for fibroids. In the past three years I have seen 32 patients who have undergone hysterectomy for fibroids, but only six of them believed that their neuroses became more severe after the operation. Two reported that hysterectomy had favorably affected their neuroses. One of the latter was freed from her alcoholism and sexual promiscuity, apparently by the termination of her premenstrual tension. This patient, however, went to extremes of chastity, and some oral trends of her neurosis became predominant. She is now being treated, and therefore her anamnestic statements are reported without further comment.

The psychiatrist presents the results of genital operations in a way different from the gynecologist. A. J. Lewis and J. Jackson,[6] who studied 67 women, mention only a short episode of insanity in a previously normal woman after cesarean section and subtotal hysterectomy. States of transitory confusion have nothing to do with the manifestations in question. The investigations of B. Milt[7] and Hans Binder,[2] who noted the effects of sterilization by partial resection of the tubes, have stated the potential dangers of this procedure which, in contradistinction to hysterectomy, fails to disturb the physiologic functions of the genital apparatus. These studies, however, contain not a single report

comparable to the following observations, although one important factor, loss of fertility, is connected with both procedures.

A few psychologic and psychosexual consequences are well known to gynecologists. The removal of a deep-seated tumor might effect anatomic changes which render sexual intercourse less painful, or even make it possible. The relief from manifold distress caused by the fibroid might exert lasting changes in the whole personality. Operations of any type are known to have devastating effect on psychotics. It is not accidental that the neurotic patient's sex behavior shows the most striking changes postoperatively. Sexual perversions appear or disappear, are cured or become unbearable.

All these studies led me to the conviction that neurotic mechanisms, of which frigidity is the most common, are contributory to the growth of fibroids.[8] Paradoxically, it is the case of a woman who was *not* hysterectomized which illustrates this complex problem most clearly. In Julius Bauer's department in Vienna,[9] and, neither before nor after, have I been able to observe a case as strikingly convincing.

CASE 1.—A woman 34 years of age was referred to me ten months after appendectomy (July 17, 1931) with the complaint of diarrhea. The operation had been performed because of severe menometrorrhagia and persistent pains in the appendical region. No anomaly of the genitals could be detected prior to the operation. The patient consented to hysterectomy on the chance that it would reveal some cause for her continuous bleeding.

She was discharged from the surgical ward on the twelfth postoperative day, but was confined to bed for the following nine months, allegedly because of suppuration of a stitch. After that she suffered from diarrhea when she walked aimlessly, although when her walking served any purpose, she felt fine.

This woman alleged that her husband neglected his marital duties to the extent of having intercourse but once or twice a year. She refrained from having extramarital relations only because she feared pregnancy.

Her reaction to the surgical trauma set in when the surgeon told her that her genitals could be saved. She desired castration so that she might indulge in promiscuity without fear of pregnancy. Since the expected hysterectomy was not performed, her first defense against her strong sexual desires diminished her resistance and facilitated the suppuration. When her confinement to bed was eventually terminated, she resorted to diarrhea as another means of defense.

Unfortunately, reactions to operations are not always so easily understood as in this case. Frequently, we observe a behavior for which we hesitate to blame the operation alone. While studying the aftermaths of hysterectomy at Sydenham Hospital, I have seen many a Negro woman who was deserted by her husband when she returned from the hospital. The reason given for the abandonment was that "he had no use for half a woman." I am far from accepting this as an adequate explanation for the husband's behavior, although I do not think this excuse should be disregarded. This brings up the whole question of the reactions on the part of the patient's relatives to the operation and the ensuing repercussions upon the patient herself.

This line of thought, although not strictly belonging to this presentation, explains some observations by no means singular or extraordinary. Psychologists are well acquainted with neurotic manifestations in men after

gynecologic operations performed upon their wives. The most common outcome is impotency. In these cases the woman's real castration is misinterpreted as a menace to the male, either a symbolic realization of death wishes against the wife, or as a safeguard against his intention of abandoning her. The phobia of a girl was centered around her mother's gynecologic operation which was performed fifteen years prior to the manifestation of the phobia. The actual reason for disclosure of this phobia was the first intercourse which symbolized the daughter's full identification with her mother.

These observations illustrate some of the complications inherent in this kind of surgery. It goes without saying that the surgeon cannot be blamed for this outcome.

CASE 2.—A white professional woman, unmarried and virginal, 46 years old, complained of uncontrollable crying spells, of a feeling of inferiority and inadequacy, or impaired sleep and failing memory. These symptoms became so severe that she was afraid of becoming completely incapacitated for her work. In the first psychologic interview, in the spring of 1944, she alleged that these symptoms began after hysterectomy performed on her in the fall of 1940. This statement was corroborated by investigation. The indications for the operation were a fibroid uterus up to the umbilicus; severe uterine hemorrhages which lasted for four years prior to the operation and caused severe anemia; and gastric, cardiac, and urinary distress. The latter manifestations were completely relieved by the surgical procedure.

There was no immediate abnormal reaction to the operation. Relieved from her manifold pains, the patient failed to notice any unpleasant aftermath as long as she stayed in the hospital. However, her strength and endurance returned slowly. A long period of inertia followed her return home and the patient noticed a steady increase in nervousness. She became afraid of losing her job, of being looked at. She was filled with a sensation of hollowness which forced her to lie down often, and to sit on the curb when she waited for a bus. She had the feeling that she had been "turned inside out."

Four months after the operation she resumed her normal activities, although hampered by the symptoms just described, symptoms which slowly gained momentum.

The patient stated that her crying spells were quite involuntary. She attributed them to recurring dialogues between "I" and "She" which were carried on according to the following pattern: "I" asked watchfully and objectively, "How does 'She' feel?" "She" responded first with consternation, then with anxiety and tenseness. "She" longed to get help from someone, but according to an iron rule which dominated the patient's existence, it was necessary to hide the need for help behind the opposite type of behavior. At first the crying spells ceased in another person's presence; however, later they became apparent in one way or another.

Further investigation showed that the "I" constantly tormented and frightened the "She." During treatment the patient once related the discovery of a lump in her breast. The "I" had forbidden her to seek help, although the patient was terrified at the thought that it might be a breast cancer. Fortunately, the tumor was found to be benign.

The relationship between the "I" and the "She" was found to exemplify the patient's antagonistic relationship to her mother. "She" was the mother; "I" was the patient who had nursed her mother during a sickness of many years' duration and yet was unmoved when the mother died. The daughter belittled her mother's intelligence, was ashamed of her poor English, and revolted

against the restrictions imposed by her mother's frailty. However, all the patient's expressions of hostility followed a pattern of childhood, when she reasoned like this: "If my mother succeeded in marrying my father, why shouldn't I be able to do the same?"

The conflict between the "I" and the "She" was fought on different battlefields. One was the patient's body; she constantly depreciated her own appearance and harbored a tremendous shame about her genitals. Another battleground was the patient's eyes, which became a symbol expressed by the phonetic identity between "I" and "Eye." The patient was convinced that her vision would eventually succumb to a glaucoma, and had seen an ophthalmologist. With her usual ambivalence, she misconstrued his diagnosis and assumed that he predicted blindness when he had actually told her that her eyes showed no deterioration. This is further evidence of her hostility toward the "I," i.e., herself.

CASE 3.—A white woman, married, childless, 30 years of age, was referred to the psychiatric clinic of Beth Israel Hospital in the spring of 1944 for obsessions. She gave the following history: In December, 1943, she consulted her family physician, complaining of pain in the left lower quadrant and frequency of urination of a week's duration. She was referred to the Bronx Hospital where subtotal hysterectomy was performed on her. Both before and after the operation, the patient showed great concern about her fertility. When after persistent inquiry she learned that the operation had left her sterile, she became deeply depressed, neglected herself, and gave utterance to suicidal ideas.

At this point, her sister-in-law stepped in and assumed the role of the psychotherapist, insisting that the sick woman "was keeping something from her mind." At her prompting, the patient confessed to an alleged rape by an older boy when she was five; and to her habit, at the same age, of "playing house" with one of her brothers. These confessions intensified the depression. At that time, she was given a series of seventeen electro shocks which relieved her depression, but subsequently, obsessions took possession of her, being heard incessantly, whenever the patient was idle. One phrase: "Why did I tell it to Judy?" (her sister-in-law) disappeared under observation and was replaced by: "I'm going to destroy myself."

When the patient was giving her history, she stated: "In the back of my mind I asked myself, why should I have this tumor?" Her own explanation was that five years prior to hysterectomy she met with a slight auto accident, in which her back bumped against the ceiling of the car and, simultaneously, she perceived "kind of sexual sensation in the womb." About three years prior to hysterectomy, a lipoma was removed from the very spot where she bumped her back. The patient believed that the tumor of the back and of the uterus were both caused by the insignificant accident.

Further details of her history led us to assume that this accident might have a deeper meaning to the patient. Supporting this assumption was the fact that twelve years before her operation, the brother with whom she had "played house" was accidentally drowned when the taxi in which he was riding was driven into a river.

This brother's role in the patient's life was revealed in sodium amytal hypnosis. To quote the patient: "The reason why he died so young was he slept with me in the same bed. Besides, he picked up my dress, examined me here and there. He used to inject something in me. A little girl of five does not experience anything. Then our mother was sick and it is natural that he examined me. We both could not live, that's why he died. Maybe God punished my brother. After my marriage, I had the feeling that if he were alive I would be in an awkward situation."

Through the use of sodium amytal, it could be shown that the patient never ceased to feel guilty for her promiscuous sex life at the age of five, that she had expressed death wishes against her brother, that the only means of atoning for her misdeeds was having a child. When the hysterectomy rendered this prospect impossible, the patient resorted to depressions, the masochistic character and function of which are obvious. When the depression was alleviated by the electro shocks, the obsessional ideas served the same purpose.

This observation shows the specificity of the hysterectomy. The removal of the lipoma had no effects on this patient's conflicts because this tumor had no emotional connection with the infantile trauma. However, the operation on the sex region destroyed the equilibrium between guilt and expiation.

It is not by chance that both tumors were connected with an auto accident and that her brother succumbed to a similar cause. This similarity of both episodes was apparently accepted by the patient's unconscious as a retaliation for her death wishes against her brother. In any case, the details presented explain the patient's frigidity and the latter, in turn, enhances the growth of fibroids, according to E. Kehrer's theory.[5] I would like to add that many women afflicted with fibroids give similar histories.

The observations just presented permit a few statements pertinent to the performance of this operation in neurotic women. First, castration may precipitate a serious psychic trauma. This aspect has been documented extensively. Second, this study shows that there is opportunity to prevent this ill effect. We may group neurotic women, about to undergo this operation, in three categories: The indifferent, the overanxious, and the masochistic. This subdivision, I believe, can be made by every physician, even without deeper psychologic training.

The Indifferent Woman.—She may accept the prospect of hysterectomy with no apparent fear or apprehension. She usually fails to have its necessity verified by other physicians. It is this type who almost idolizes the physician who performed the operation, who bears willingly and submissively all restrictions, who pays, without the slightest hesitation, any fee requested. On the other hand, she will minimize the seriousness of her symptoms, thus seeking help as late as possible. In other words, she establishes a strong positive transference to the physician, thus reviving her old relationship to her father. That was clearly shown in the second case report in which a woman's castration complex is expressed in the wish fulfilment type, according to K. Abraham.[1] The main complaint of this patient was that castration had rendered life worthless to her, preventing her from further fantasies.

So far as this type is concerned, I must admit the difficulty, even impossibility of predicting this outcome. This patient had been operated on by an outstanding gynecologist who was renowned for his interest and activity in psychoanalysis. Behind a submissive facade and a ladylike attitude, this patient concealed her neurosis, and she revealed it only when she was faced with complete destruction. She was afraid to hurt her doctor's reputation and confide in him the deterioration of her neurosis subsequent to his indispensable surgery.

The Overanxious Woman.—This woman will turn to numerous other authorities for re-examination and re-consideration of the necessity of the proposed surgery. She might insist that only the tumor be removed and that otherwise her genitals be kept intact—an insistence apparently exaggerated if the patient is single, virginal, and close to the menopause. She simply cannot give herself in any physician's hand, she impulsively bargains about the site of the

incision, the portion to be removed, especially and persistently about the fee; she wishes to be informed about the time needed for operation and convalescence, kind of anesthesia, and many other details of lesser importance.

Their wish to save fertility stems from the craving to compete with men, as shown in their professional career and conduct of marriage. These women were classified by K. Abraham[1] as the revengeful type, and the next victim is the operator whom she charges with neglect, incompetence, or selfishness. These patients will accuse the operator of having ruined her health, they will make him responsible for having caused her menopausal symptoms, even many years after the operation.

The last case report illustrates this type in which psychotherapy is instrumental in changing this disastrous attitude thoroughly by presenting the patient with its predominant trends. The symbolic meaning of a child of her own, delivery, or pregnancy, is self-evident in the case presented and is similar in other patients. One has to keep in mind that the symbol child is usually replaced by other objects, for instance, by a social position, professional career, finally, by the choice of the sexual object.

The Masochistic Woman.—This type has been discussed widely in the literature in which monstrous examples are recorded. Grünert[4] described a woman 39 years of age who was operated upon for adhesions four times a year with a total of twenty-six laparotomies; and Drescher[3] reported on a 23-year-old girl with a record of seven different operations within less than two years. Krönig referred to the *furor operativus passivus* of this type. I would like to group my first case in this class, although her appendectomy was her only operation. I am convinced that a woman of her type will find reasons for numerous operations, and also surgeons willing to perform them.

It must suffice to suggest that this type should be treated psychologically at the earliest convenience, that the operation be postponed (of course, only if circumstances allow) until the psychological preparation has yielded some results. The prognosis is, generally speaking, excellent.

Conclusions

The closing words of my presentation aim to forestall criticism on the surgeon's part. The discussion of this postoperative complication merely stresses the fact that castration for uterine fibroids is likely to elicit untoward neurotic reactions, which are less due to surgery itself than to some psychodynamics which, in my opinion, are acting upon myofibroids in one way or another. This investigation strives for the elimination of one factor which might abate the results of surgery.

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RESPIRATION DURING THE FIRST HOUR OF LIFE

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SINCE demerol was synthesized in 1939 by Eisleb and Schaumann, there have been many reports of its effective use and pharmacologic action. The purpose of this study was to determine if the use of demerol and hyoscine during labor exerted any action on the respiration of the newborn infant, when given in dosages recommended by Roby and Schumann;[1] and also to obtain accurate information on the respiration of the newborn from the time of birth to one hour of age.

The equipment used in carrying out this study is the same as that developed and used by Deming and Washburn[2] in their report, "Respiration in Infancy." Records were obtained by an indirect method. The newborn's body was placed in an air-tight cylinder with the head outside of the chamber. A circular rubber collar was used to make an air-tight seal around the infant's neck. A spirometer was connected with the air-tight cylinder, and a writing point was attached to the spirometer float. Recordings were made on a kymograph. Inspiration was represented by upstrokes on the records, and expiration by downstrokes.

Results

A total of 68 records of respiration in 40 infants during their first hour of life were obtained. The earliest records were obtained on two infants seven minutes of age. Eighteen records were obtained between 10 and 15 minutes of age, 23 records between 16 and 30 minutes, 14 records between 31 and 45 minutes, and 11 records between 46 and 60 minutes of age. All records obtained were on full-term normal infants, and none of the recordings were made while the infants were crying. All but two newborns in this group were delivered vaginally. These two infants were delivered by cesarean section after eight- and nine-hour tests of labor for borderline cephalopelvic disproportion. These two cases were not separated from the others in the statistical analysis because of their similarity to the other cases.

Fifty-three records were obtained on 31 newborns whose mothers had received demerol and hyoscine. The minimum dosage was 100 mg. of demerol and 0.6 mg. of hyoscine. The maximum dosage given was 300 mg. of demerol and 1.5 mg. of hyoscine during a nine-hour period before delivery. In two instances the medication was given intravenously ten minutes before delivery. Seventeen of the patients received demerol and hyoscine one hour or less prior to delivery. Thirty-one records were obtained on these 17 patients. Twenty-two records were made on 14 patients who received the medication over one hour before delivery. An analysis of these records appears in Table I.

From Table I it can be seen that the time of administration of demerol and hyoscine prior to delivery exerts little or no effect on the newborn baby's respiration.

In Table II a comparison of the 53 records obtained on cases receiving demerol and hyoscine is made with the 15 records in 9 cases not receiving any medication.

TABLE I

	PATIENTS RECEIVING DEMEROL AND HYOSCINE 1 HOUR OR LESS BEFORE DELIVERY	PATIENTS RECEIVING DEMEROL AND HYOSCINE MORE THAN 1 HOUR BEFORE DELIVERY
Rate of respiration		
Range	28 to 78/min.	24 to 64/min.
Average	44.9/min.	43.7/min.
Average depth of inspiration		
Range	11.26 to 31.23 c.c.	15.38 to 26.23 c.c.
Average	20.19 c.c.	19.98 c.c.
Minute volume of inspired air		
Range	459.69 to 1,593.14 c.c.	464.31 to 1,390.62 c.c.
Average	887.03 c.c.	874.44 c.c.
Minute volume per pound body weight		
Range	59.9 to 212.7 c.c.	64.9 to 188.1 c.c.
Average	128.02 c.c.	120.98 c.c.

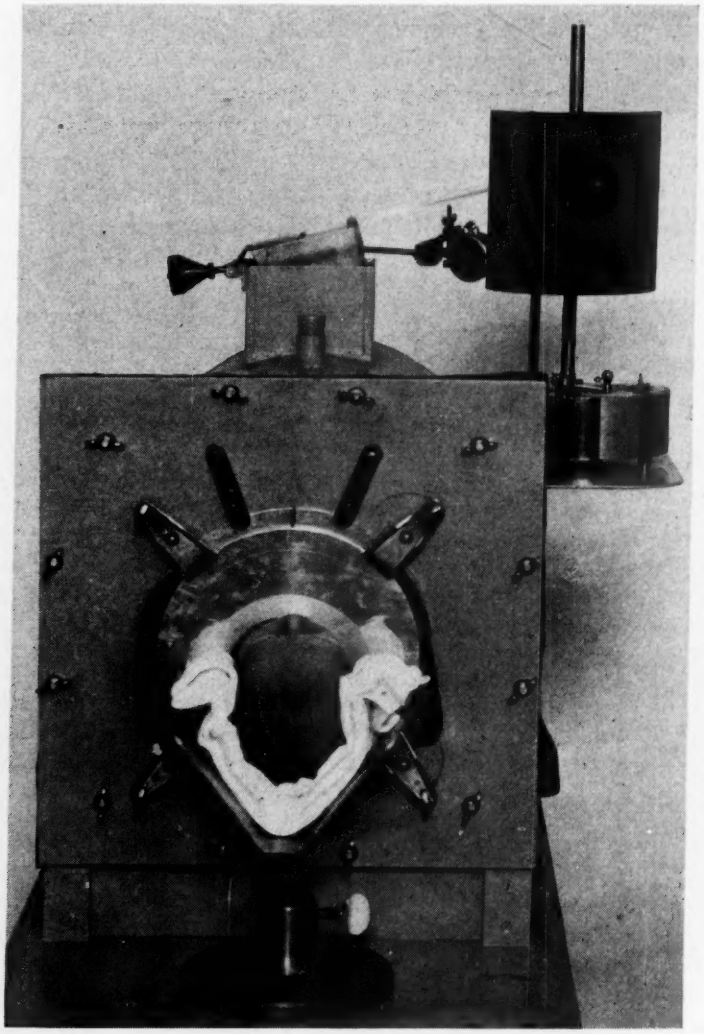

Fig. 1.—Photograph of equipment used in this study. Reprinted with the permission of Dr. A. H. Washburn.

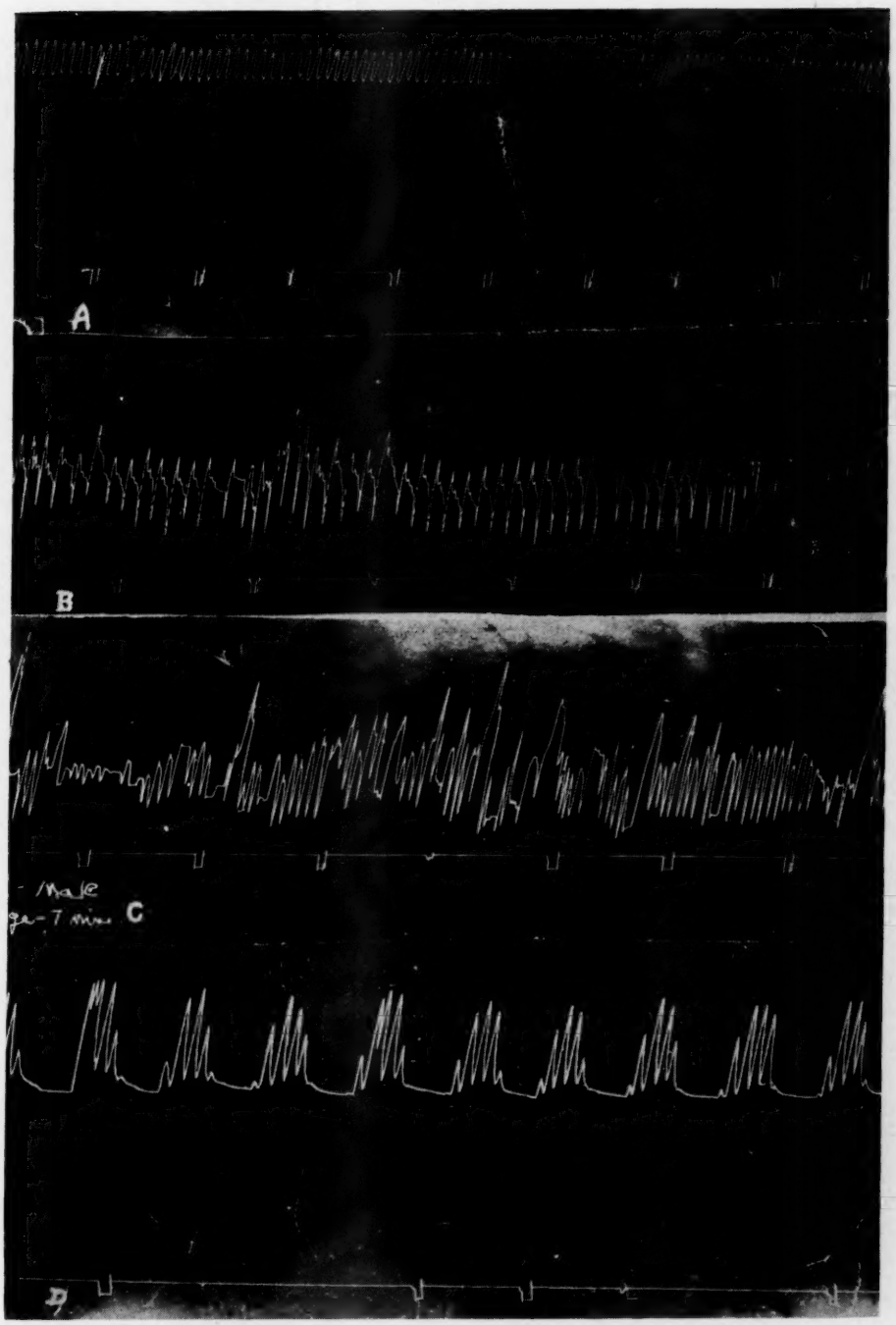

Fig. 2.—*A*, Example of regular type of respiration obtained on an infant 15 minutes after birth.

B, Example of cog-wheel expiration obtained on an infant 25 minutes old.

C, Example of irregular type of respiration obtained on an infant 7 minutes old.

D, Example of extremely periodic type of respiration obtained on an infant 3 days old. Note the fine excursions that occur during the apneic portion of the record due to heart action.

TABLE II

	PATIENTS RECEIVING DEMEROL AND HYOSCINE	PATIENTS NOT RECEIVING DEMEROL AND HYOSCINE
Rate of respiration		
Range	24 to 78/min.	24 to 66/min.
Average	44.4/min.	48/min.
Average depth of inspiration		
Range	11.26 to 31.23 c.c.	13.03 to 38.40 c.c.
Average	20.10 c.c.	17.16 c.c.
Minute volume of inspired air		
Range	459.69 to 1,593.14 c.c.	455.07 to 1,769.46 c.c.
Average	880.53 c.c.	810.17 c.c.
Minute volume per pound body weight		
Range	59.9 to 212.7 c.c.	78.8 to 247.4 c.c.
Average	124.9 c.c.	121.66 c.c.

Comment

From this tabulation one can conclude that demerol and hyoscine definitely exert no effect on the respiration of the newborn. Therefore, when abnormalities occur in the respiration of the newborn after demerol and hyoscine medication, the etiology must be explained on some basis other than the medication.

In all but one case the infants cried within a few seconds of delivery and no resuscitation was required. Resuscitation was necessary in the one case of a persistent occiput posterior. This study would undoubtedly have been more interesting if records could have been obtained before 7 minutes of age. This was impossible because of the technical difficulties of placing and sealing the infant in the chamber. Even though most of the effects of a general anesthetic on the newborn have disappeared after seven minutes, it was deemed advisable to make a comparison between the respiration of those infants born from mothers receiving a general anesthetic with those born from mothers not receiving a general anesthetic. There were 21 cases in this series delivered while the mother was receiving a general anesthetic (ether or cyclopropane). The other cases, in most instances, were delivered with the aid of a pudendal block. Those cases receiving a general anesthetic received only oxygen just prior to the delivery of the head and during delivery of the body, never allowing the anesthetic to become so light that the patient became restless. There is no doubt that an incorrectly administered general anesthetic does exert a definite influence on the newborn's respiration; however, this was not noted in our cases. The minute volume per pound body weight is used for comparison, since we feel this is the most accurate basis for comparison of respiration in the newborn. In 37 records on the 21 patients receiving a general anesthetic the minute volume per pound body weight was 124.28 c.c.; whereas, in the 31 records on the 19 patients not receiving a general anesthetic, it was 124.08 c.c. Therefore, we conclude that the general anesthetic exerted no effect on the infants' respiration after 7 minutes of age.

A comparison was also made in the minute volume per pound body weight in relation to the parity of the mother. The 14 babies delivered from multiparous mothers had a minute volume per pound of 134.2 c.c.; whereas, the value for the 26 babies delivered from primiparous mothers was 117.8 c.c. Even

though this is a small series of cases, we believe that a difference of 16.4 c.c. per pound body weight is great enough to be of significance.

In summarizing our records to obtain values for respiration in infants one hour of age or less, it was felt that all 68 records should be included, since no evidence of any effect of either the medication or the anesthetic could be found in the previous analysis. A comparison is presented with the values obtained by Deming and Hanner[3] for infants during their first day of life.

TABLE III

	AVERAGE RATE PER MINUTE	AVERAGE DEPTH OF INSPIRATION PER C.C.	AVERAGE VOLUME PER MINUTE, C.C.	AVERAGE VOLUME PER POUND, PER MINUTE, C.C.
Our results	45	19.43 c.c.	861.5 c.c.	124.1 c.c.
Deming and Hanner	41	18.70 c.c.	734.0 c.c.	106.1 c.c.

In all instances our values for the infant one hour of age or less are higher than the values reported by Deming and Hanner for infants during their first day of life. Their results are very similar to values we obtained on six infants later during the first day of life. Therefore, we feel justified in concluding that the volume of air inspired per minute per pound body weight is higher during the first hour following delivery than later during the first day of life.

No attempt was made to divide the records into types of breathing; however, it is of interest that all but one of the types described by Washburn and Deming were noted. The periodic (Cheyne-Stokes) type of respiration they describe was not obtained on any of the infants one hour of age or less, but was obtained on a normal female infant three days of age. Photographs of the types observed are included (Fig. 2). The record obtained on the 3-day-old infant is included to illustrate the accuracy of the equipment used. In the apneic portion of this record, the infant's heartbeat is recorded.

Summary

1. Analysis of 68 records of respiration in the newborn one hour of age or less is presented.

2. From this study it has definitely been shown that demerol and hyoscine, no matter when administered, exert no effect on the respiration of the newborn from 7 minutes to one hour of age. This had been accepted as a clinical fact; however, prior to this time, no accurate assay has been presented.

3. It has been shown that a general anesthetic, when it is properly administered, exerts no effect on the respiration of the newborn after 7 minutes of age.

4. During the first hour of life infants born of primiparous mothers had a lower respiratory volume per pound body weight than those born of multiparous mothers.

5. The volume of air inspired per minute per pound body weight is greater during the first hour following delivery than later during the first day of life.

6. Values are presented which can be used as normal values for respiration in the very young infant.

The author is greatly indebted to Dr. A. H. Washburn for the use of the equipment which made this study possible, and to Dr. C. B. Ingraham and Dr. Richard Whitehead for their numerous helpful suggestions.

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EARLY PUERPERAL RISING*

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STIMULATED by the success which has attended the early ambulation of general surgical patients, a study was undertaken of the effects of similar treatment on women immediately after childbirth. The careful basic work of Bernard Newburger,[1] published posthumously in 1943, showed that in experimental rats postoperative activity accelerated the early phase of healing of incised tissues, and it was felt that the physiology of the pregnant and parturient woman did not differ sufficiently from that of other surgical conditions to anticipate a less favorable result than that obtained either in experimental animals or human surgical cases.

A total of 221 women were studied between December, 1944, and December, 1945, at the Regional Hospital, Fort Knox, Kentucky; McCaw General Hospital, Walla, Walla, Washington; and Bushnell General Hospital, Brigham City, Utah. The need for early postpartal activity came about both because of the shortage of beds allotted in Army hospitals to dependents of officers and men in the service, and the necessity on the part of the young wives of reducing to a minimum the period of invalidism following their deliveries. These girls lived near Army posts far from mothers and relatives who might help them on their discharge from the hospital, and home nursing help, either trained or practical, as well as domestic help, was almost impossible to obtain. Their living conditions were often substandard, and most of the young mothers lived in constant expectation of sudden changes in station or overseas' orders for their husbands. Thus, almost the entire group was impelled by circumstances to forego the luxury of ten days in the hospital and three more weeks of semi-invalid care and consideration as convalescents.

At first the cases for early rising were selected, but because of the encouraging results, a routine was gradually developed which was used on all uncomplicated parturitions. The exceptions included any general medical or surgical condition, toxemia, severe anemia, the loss of over 500 c.c. of blood at the time of delivery, and any unusual circumstances of labor that offered potentialities of infection. The use of forceps and episiotomy, which was almost routine, was not a contraindication. The procedure consisted of:

1. Standing, assisted, by the side of the bed for one full minute within the first twenty-four hours after delivery. The patient was allowed to lie on her abdomen as desired, and a full diet was offered to her.

2. On the second day she sat on a chair for five minutes.

3. On the third day (a) the patient sat up in a chair some distance from the bed, and to which she walked for five minutes twice during the day; (b) abdominal exercises in bed were started, consisting of tensing the abdomen and alternately raising and lowering the head and shoulders (unassisted by the arms) to the easily tolerated height, ten times, 3 to 5 times a day.

*Presented at a meeting of the Cincinnati Obstetrical Society, May 16, 1946.

4. On the fourth day (ninety to one hundred hours post partum), in addition to the abdominal exercises which were continued daily, the twice daily use of the knee-chest position (without spreading the buttocks) for two minutes was begun. The patient spent thirty minutes in a chair in the morning (while the bed was being made) and, if the response was good, was allowed to eat her evening meal sitting up at a card table.

5. She was allowed up and about twice for thirty minutes each time on the fifth day and, if she had a private room, was given toilet privileges.

6. On the sixth day all patients were given toilet privileges and permitted three one-hour periods out of bed. She was instructed in perineal care and practiced it herself.

7. On the seventh day the patient was permitted to take a shower and spend half the hours of the day up. Because of the nursing shortage she was encouraged to make her own bed. She ate all her meals at a table, and received instruction in the nursery.

8. On the eighth day she was allowed to wash her hair herself, and was encouraged to walk through the corridors of the wing. If she desired to go home, or if there was a shortage of beds, she was discharged.

9. Her instructions included the continuation of the abdominal and knee-chest exercises, and the addition over the next two weeks of others involving the leg, abdomen, and flank muscles. She was permitted to go up and down stairs cautiously and with limitations that varied with the circumstances. Douches were begun with the appearance of lochia alba. The patient was advised to be gradual in her resumption of work, and in a few cases was allowed to travel, even across the country, when the baby was three weeks old.

No harmful effects were noted as long as five months post partum. On the contrary, the benefits of this regimen were striking. The women consistently had a high morale and a sense of well-being, and multiparas compared their status daily with that of the previous pregnancies with actual enthusiasm.

The degree of involution of the uterus was not recorded, but the impression remains that it was faster than usual. The lochia was more profuse the first three days, despite the exhibition of oral ergonovine. In only 17 cases was true lochia rubra noted on discharge from the hospital, and in only one did it persist for three weeks. Retained secundines were extracted in two cases of subinvolution at the hospital, and in a third case a roll of secundines was withdrawn at the six-week visit, there being, however, no bleeding during the interval. One woman developed a severe uterine hemorrhage on the eighth day, the cause being undetermined, but, as she had had an identical episode with her first pregnancy during which she had been in bed for seven days post-partum, it was deemed irrelevant to the early rising.

Episiotomies were repaired with No. 0 plain catgut in layers, subcuticularly for the skin. In three cases there was separation that included the muscle layers. One woman weighed 286 lbs., and tissue healing under the best circumstances would have been difficult; the second woman had a frank infection of the episiotomy area before the separation, and it is questionable what part activity played; in the third case no specific cause was assignable. But the percentage of separations was not significantly greater than is found in ordinary cases.

There were no frank pelvic infections, and during the hospital stay only five cases of true morbidity were recorded (100.4° F., lasting two or more

days). One was the infected episiotomy, and one was accompanied by such terrific breast engorgement as to leave no doubt as to the cause. The other three represented low grade infections of the lochiametra type. Again, this incidence represented no increase in morbidity that might be ascribed to early rising.

One woman only had any symptoms that might conceivably have indicated thrombophlebitis, but she had no fever. The routine was interrupted in her case, keeping her in bed; after three days, during which her symptoms disappeared, she was allowed up and was discharged on the tenth day.

Lactation seemed to be unaffected by the early activity, although no specific studies were made. An unusually large number of these mothers preferred not to nurse, and lactation was suppressed easily with estrogenic substance.

Unfortunately, only 140 of these 221 patients reported for examination six weeks post partum. Among these women, 23 had a uterus that was definitely retroverted (third degree), and another eight were described as having first or second degree retroversion. This is at most 26 per cent, which compares favorably with the 40 per cent of women ordinarily conceded to have retroversion at the six-week visit. There were no cases of descensus and no sequelae of childbirth that might be ascribed to straining of the ligaments or failure to rest the heavy puerperal uterus. This is to be expected, inasmuch as recumbency allows gravity to exercise the least favorable effect on the pelvic organs. While no exact figures are available for comparison, remarkably few women complained of leucorrhea, and only 21 had any cervicitis that warranted comment in the records.

The women were enthusiastic without exception in their report of how they felt during the six-week interval. By the fourth week most of them were doing as much or more than they had done before pregnancy. They felt vigorous and energetic; the comments of the multiparas were of particular satisfaction, regarding not only the physical benefits, but the psychological results.

Summary

Report is made of the experiences in three Army hospitals with 221 parturitions after which a regimen of early exercise and activity was directed. The routine included standing for one minute the first day post partum, sitting in a chair for five minutes the second day, abdominal exercises in bed, and two five-minute sitting episodes the third day, knee-chest exercises and two thirty-minute sitting periods the fourth day, walking about and toilet privileges on the fifth or six day, a shower the seventh day, and discharge from the hospital on the eighth day when desired or necessary.

The incidence of complications, subinvolution, prolonged lochia rubra, episiotomy breakdown, infections, and uterine retroversion was not greater than that found in any series of women treated puerperally with bed rest for six or seven days and hospitalization to the tenth day.

It is felt that early puerperal rising in uncomplicated cases of childbirth is desirable and without danger or unfavorable sequelae. The women have a

sense of well-being and are benefited psychologically not only during the puerperium, but in their attitude toward the entire episode of pregnancy. They are prepared by the regimen of increasing activity to leave the hospital by the eighth day post partum, and their convalescence at home is shortened considerably.

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701 UNION CENTRAL BLDG.

RELATION OF EARLY RISING TO MORBIDITY IN CESAREAN SECTION

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IN 1945 Johnston[1] read a paper before the American Association of Obstetrics and Gynecology in which he stated that in 1923 to 1926 in Houston, Texas, while general surgeons were doing cesarean sections, the maternal mortality was 14.4 per cent. He condemned the operation in the hands of general surgeons. This statement caused us to review our records and compare our standards with those published by other authors as to maternal mortality, fetal mortality, and maternal morbidity. Dieckmann[2] states that maternal mortality should be below 0.5 per cent.

In the period from Jan. 1, 1940, to Jan. 1, 1946, the senior author has performed 207 consecutive cesarean sections without a maternal death. This compared with the figure offered by Johnston[1] of 2.2 per cent; Smith,[3] of 0.9 per cent; Free,[4] of 0.4 per cent; Gustafson,[5] of 0.96 per cent; Barney, et al.,[6] of 1.7 per cent; Rosenson,[7] of 3.2 per cent; Briscoe,[8] of 0.7 per cent; and DeNormandie,[9] of 2.5 per cent.

In Norristown, Pennsylvania, there are no obstetricians who perform cesarean sections. However, there are obstetric chiefs of service who are consulted concerning obstetric practice and emergencies. These men refer the cases to the surgeon for operation. Most of the cesarean sections, therefore, are done on a consultation basis.

From Jan. 1, 1944, to Jan. 1, 1946, 102 cesarean sections were performed by the senior author. The number of hospital deliveries was 2,756, and the total number of cesarean sections by all surgeons was 132, giving an incidence of 4.8 per cent. This is not a true figure, however, because some of our cases are sent from surrounding communities which have hospitals, and many home deliveries are still being done. The indications for this series are outlined in Table I.

In this series our maternal mortality was zero. Our fetal mortality was 5 per cent. Three of these babies were stillborn, and the other two died within twenty-four hours after delivery. The first stillborn was one of twins, in a 17-year-old unmarried Negro girl who had no prenatal care. The fetus was macerated and gave evidence of being dead for a number of days. The other twin was normal and was discharged with the mother. She was admitted as a convulsive eclamptic and was operated upon on the fifth day after admission. The second was a 22-year-old gravida ii, seven months pregnant, who had a premature separation of the placenta. Because of the distance involved in traveling, she was not sectioned until two hours after the onset. The baby was found compressed by a huge clot. The third case was also in a patient with premature separation of

TABLE I. INDICATIONS FOR SECTIONS

1. Eclampsia		6
2. Placenta previa		9
3. Previous section		15
4. Cardiac pathology		2
5. Cephalopelvic disproportion		
By x-ray	7	
By trial labor	18	25
6. Elderly primigravida		5
7. Patient's desire		12
8. Abnormal position		7
9. Deformity of mother		2
10. Premature separation of placenta		3
11. Contracted pelvis		14

the placenta. The other two deaths were due to prematurity. The first was a 21-year-old, gravida i, who began to bleed profusely from placenta previa at seven months. The baby survived twelve hours. The other case was a 32-year-old gravida ii who had a previous section. She went into labor prematurely at seven and one-half months, and the baby died fifteen hours after delivery.

Using the standard of the American Committee of Maternal Welfare (temperature 38° C. or over, for two or more consecutive days), our morbidity is 9 per cent. The causes of this morbidity are listed in Table II. Our percentage

TABLE II. CAUSES OF MORBIDITY

1. Endometritis	6
2. Pyelonephritis	2
3. Wound infection	1

compares favorably with figures offered by Smith,[3] 33 per cent; Free,[4] 31 per cent; and Gustafson,[5] 26.6 per cent in elective cases and 53 per cent in emergency cases as compared with Barney et al.,[6] 45 per cent; Briscoe,[8] 23.2 per cent for classical sections, and 9.5 per cent for low cervical operations.

There are certain factors which, we feel, definitely influence morbidity. First, is the type of the operation and the skill of the surgeon. We use a six inch Pfannenstiel type of incision and do a low cervical operation, with suturing of the parietal peritoneum to the uterovesical peritoneum to prevent contamination of the general peritoneal cavity. The uterus is closed in two layers with a continuous suture of chromic catgut No. 1, and a cotton technique is used for the closure of the abdominal wound; cotton No. 40 for anterior sheath of the rectus; cotton No. 70 for subcutaneous tissue and skin.

The second factor is the use of continuous spinal anesthesia for all cases. We use pontocaine and glucose mixture. The continuous method is used so that the smallest possible amount of anesthetic agent may be given, but more is available if needed. We have found no contraindications for the use of this type of anesthesia.

The third factor is good prenatal care. Most of our referring physicians are meticulous concerning this factor.

The fourth factor is the avoidance of postoperative catheterization. Early rising and bathroom privileges obviate this complication. Furmethide is used occasionally when necessary.

The fifth factor is an early decision to operate. If the indication is present, the operation should be done before the patient loses strength, and rupture of the membranes or frequent examinations allow opportunity for sepsis to develop.

The sixth and most important factor is early rising postoperatively. We feel that early rising postoperatively definitely lowers the morbidity. During the latter half of 1944, because of favorable reports from various authors[10-14] concerning early rising, we started allowing our patients out of bed on the third postoperative day. Because they did so well, we allowed a few out of bed on the second postoperative day. The results were still more satisfactory, so we routinely allowed all patients out of bed on the first postoperative day. Forty-nine patients were allowed out of bed on the first postoperative day, eleven on the second, and ten on the third. Thus, seventy of our one hundred two cases were out of bed on the third day or before. In this group only two were morbid, a percentage of 2.8 per cent! The first patient was a 24-year-old primipara who was in labor thirty-six hours before we were called. Her temperature was elevated to 101° F., on the second postoperative day, and 101.3° F. on the third day. Following this her temperature returned to normal and remained so.

The second case was a 33-year-old gravida v who was admitted to the hospital in a condition of eclampsia with convulsions. She had concurrently a pyelonephritis with a preoperative temperature ranging between 102° to 104° F. She was delivered of a viable baby and had a normal postoperative course until the sixth day, when the pyelonephritis recurred. This was controlled within a few days.

In this series of 102 cases, there were no cases of thrombophlebitis, phlebothrombosis, upper respiratory infection, pulmonary embolism, cystitis, or wound dehiscence, and only one wound infection. The wound infection occurred in the eclamptic with the macerated fetus. By careful postoperative examination we found no cases of subinvolution of the uterus, prolapse of the uterus, formation of cystocele or rectocele that could in any way be attributed to the fact that the patients were allowed out of bed early. We, therefore, feel that early rising definitely lowers morbidity following cesarean section, and that no complications occurred from its use.

Because our patients are ambulatory and do not develop complications, they are allowed home on the seventh day and eighth day postoperatively. This allows a considerable economic saving to the patient and gives a quicker hospital turnover, allowing full use of the available hospital facilities.

Summary

1. Two hundred seven cesarean sections were presented with the maternal mortality of 0. One hundred two consecutive cases are reported with a fetal mortality of 5 per cent, and maternal morbidity of 9 per cent. In cases in which patients were allowed out of bed early, the morbidity was only 2.8 per cent.

2. No complications developed from the routine practice of getting all patients out of bed on the first postoperative day.

3. Early rising definitely limits the incidence of postpartum and postoperative complications.

4. Early rising leads to considerable economic saving to the patient and allows full use of the available hospital facilities.

5. The patients are grateful not only for lessened expense, but also because of the definite improvement in the postoperative sense of well-being and avoidance of the marked weakness so noticeable in patients kept in bed twelve or fourteen days.

6. The foregoing statistics definitely prove that in the hands of the well-trained general surgeon, the operation of cesarean section can, and is, a safe procedure. The morbidity and mortality can be, and sometimes are, lower in such hands than in those whose work is strictly limited to obstetrics.

Since acceptance of this article for publication, twenty-six cesarean sections were performed; all were ambulatory on the first day with no mortality, and only one patient was morbid for thirty-six hours.

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COMPOSITION OF THE HUMAN PLACENTA

II. Lipid Content

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LIPIDS are important sources of nourishment for the growing fetus and, with the improved methods of analysis, it has been possible to determine the partition of the various lipid fractions in the tissue of placentas delivered following the birth of normal infants at full term.

Klaus[1] emphasized that methods of preparing the tissue and the selection and use of solvents in the extraction process explain the diverse results present in the literature on the lipid content of the human placenta. Higuchi[2] found in full-term human placentas 0.85 Gm. of fatty acids per 100 Gm. of fresh weight, but if the placentas were thoroughly washed, only 0.54 Gm. per 100 Gm. was found, indicating that one-third of the first value was from the blood present. Klaus drew attention to the comparatively low values for lipid phosphorus which Bienenfeld[3] obtained, attributing them to the use of petroleum ether as an extraction solvent. The special value of Bienenfeld's work lay in her early demonstration of the reduction of lipids in the human placenta during pregnancy. Her comparison of placentas from pregnancies of three to five months with placentas at term indicated a decrease in total petroleum ether extract from 8.6 to 4.4 per cent of the dry weight. Total cholesterol dropped from 2.25 to 0.37 per cent of the dry weight and cholesterol esters from 1.25 to 0.12 per cent, thus the free cholesterol diminished less than did the cholesterol esters.

Watanabe,[4] in the developing human placenta, demonstrated a fall in total cholesterol, total ether-soluble phosphorus, total lipids, and total fatty acids. Needham[5] pointed out that Watanabe's data definitely brought into focus the question of the source of fetal food: whether the placenta elaborates and stores nutriments or whether the fetus draws from the maternal blood as needed. Watanabe's lipid data, expressed in terms of weight of the embryo, show that at the fourth month of development the fats and lipids of the placenta are present in greater quantity in relation to the weight of the embryo than at any other time. From these results Needham points out a similarity between the developing placenta and the developing hen's egg. In both there is disintegration of the lipid, releasing fatty acids, phosphorus, and choline.

Evidence of important nutritional functions of the placenta have been contributed by Boyd and Wilson,[6] who, in experimental studies on the transfer of nutriments through the umbilical vein to the human fetus, have demonstrated the passage of phospholipids, free cholesterol, and cholesterol esters.

Procedure

The lipid distribution was determined in placentas obtained following delivery of nine healthy women at full term.* The preparation and drying of the material are described in the preceding paper.[7] The dried material was extracted with hot ethanol, then with ethyl ether. The final extracts, combined, represented approximately a three to one mixture of alcohol and ether,

TABLE I. THE LIPID DISTRIBUTION IN NINE HUMAN PLACENTAS*

SUBJECT	TOTAL LIPID	NEUTRAL FAT	ESSENTIAL LIPID†					PHOSPHOLIPID			
			TOTAL	CEREBROSIDES	FREE CHOLESTEROL	CHOLESTEROL ESTERS	TOTAL CHOLESTEROL	TOTAL	CEPHALIN	LECITHIN	SPHINGOMYELIN
L. F.	13.41	3.89	9.52	0.40	0.95	0.67	1.35	7.50	2.30	4.29	0.91
V. G.	12.92	3.99	8.93	0.62	1.00	0.53	1.32	6.78	1.92	3.69	1.17
V. K.	11.66	2.63	9.03	0.98	1.09	0.31	1.28	6.65	2.47	3.04	1.14
V. L.	12.73	3.84	8.89	0.29	1.06	0.49	1.35	7.05	2.54	3.43	1.08
J. M.	10.97	2.16	8.81	0.29	1.05	0.52	1.36	6.95	2.25	3.75	0.95
D. M.	11.21	2.15	9.06	0.76	0.89	0.79	1.36	6.62	2.70	3.04	0.88
C. O.	16.75	7.75	9.00	0.32	0.95	0.44	1.21	7.29	3.34	2.95	1.00
V. S.	11.94	2.57	9.37	0.90	0.99	0.66	1.38	6.82	1.47	4.40	0.95
A. S.	9.61	2.59	7.02	0.18	0.89	0.48	1.17	5.47	1.36	3.33	0.78
Average	12.36	3.51	8.85	0.53	0.99	0.54	1.31	6.79	2.26	3.55	0.98

*Values are percentages of dry weight.
†Essential lipid includes phospholipid.

and were analyzed for sphingomyelin, total and free cholesterol, galactose, and acetone-soluble glycerol. From the analyses, total phospholipid, choline phospholipid, cephalin, lecithin, cholesterol ester, cerebrosides, and neutral fat were calculated. The complete details of all methods used for analyses have been published.[8]

Results

The lipid composition of each of the placentas is presented in Table I. The total lipid averaged 12.36 per cent of the dry weight, and neutral fat, 3.51 per cent. Bienenfeld obtained a total lipid value of 4.4 per cent of the dry weight (petroleum ether extract); Mohr and Heimann[9] found 15.75 per cent; Mohr and Freund,[10] 10.0 per cent; Polano,[11] 6.4 per cent; and Watanabe,[4] 11.26 per cent.

The average essential lipid (total lipid minus neutral fat) was 8.85 per cent of the dry weight, with total phospholipid composing 6.79 per cent, of which 2.26 per cent was cephalin, 3.55 per cent lecithin, and 0.98 per cent was sphingomyelin. Cerebrosides averaged 0.53 per cent; free cholesterol, 0.99 per cent; and cholesterol esters, 0.54 per cent of the dry weight.

The highly specialized and functionally active placental tissue is relatively high in free cholesterol and phospholipid, a characteristic of other organ tissues, in contrast to the low phospholipid and free cholesterol contents of muscle.[12, 13]

Thannhauser, Benotti, Walcott, and Reinstein[14] have reported the phospholipid analyses of normal human organs and, in general, the lipid composition of the placenta resembles that of such organs as the lung, kidney, and heart. This resemblance is especially marked in the phospholipid content and in the lecithin to cephalin ratio, which is high for the placenta.

The phospholipid to cholesterol ratio was found to be 5.2, quite similar to the ratio of 5.8 for newborn rats,[15] or to smooth muscle, for which Bloor[16] reports an average ratio of 4. In the placenta, as in newborn rats, cephalin is lower than lecithin, a relationship which is reversed as the rat matures.[15] Free cholesterol also is higher than cholesterol esters in young rats and placenta, whereas in older rats the latter are present in the greater amounts. The ratio of free cholesterol to cholesterol esters in the placenta, 1:0.54, is the reverse of that found by Klaus, who obtained 0.40 per cent of free cholesterol and 1.69 per cent of cholesterol esters, a ratio of 1:4.2. Bienenfeld found a ratio of 1:0.4, although her absolute values were much lower than were obtained in the present study, 0.30 per cent of free cholesterol and 0.12 per cent of cholesterol esters. Total cholesterol represented 1.31 per cent of the dry weight, while Klaus[1] reported 1.40, Bienenfeld,[3] 0.37, and Mohr and Heimann,[9] 1.55 per cent of the dry weight.

The guinea pig and the human being both show a lipemia in pregnancy,[17, 18] in contrast to many other animals, and, as Boyd has pointed out, in gross and microscopic appearance the placentas of guinea pigs and women are much alike. Boyd[19] has reported the neutral fat, cholesterol, and phospho-

TABLE II. AVERAGE LIPID DISTRIBUTION IN NINE HUMAN PLACENTAS

PER CENT OF TOTAL LIPID		PER CENT OF ESSENTIAL LIPID		PER CENT OF PHOSPHOLIPID	
Neutral fat	32.3	Cerebrosides	6.0	Cephalin	33.3
Essential lipid	67.7	Free cholesterol	11.2	Lecithin	52.3
		Cholesterol esters	6.1	Sphingomyelin	14.4
		Phospholipids	76.7		

*The investigation of the composition of the placenta was a part of studies of mothers during pregnancy and lactation, the composition of their milk, and the growth of their infants. Partial support for the investigation was given by the Nutrition Foundation, Inc.

lipid contents of the guinea pig placenta. With the exception of neutral fat, his work shows a different lipid pattern from that in the human placentas reported here. In the guinea pig free cholesterol and phospholipid are double, and ester cholesterol one-half that found in human placentas.

Table II summarizes the lipid pattern of the placentas. Of the total lipid, two-thirds was essential lipid (total lipid minus neutral fat). The largest component of the essential lipid, approximately three-fourths, was phospholipid, with free cholesterol comprising 11 per cent, and cerebrosides and cholesterol esters each 6 per cent. Of the phospholipid, one-half was lecithin, one-third was cephalin, and 14 per cent was sphingomyelin.

Summary

The total lipid (phospholipid [cephalin, lecithin and sphingomyelin] free and combined cholesterol, cerebrosides and neutral fat) distribution in nine human placentas is reported. No great individual variations in the lipid pattern were noted. Of the total lipid, one-fourth was neutral fat. Phospholipid comprised three-quarters of the essential lipid (total lipid minus neutral fat); and of the phospholipid content, one-half was lecithin, one-third was cephalin, and 14 per cent was sphingomyelin.

The total lipid averaged 12.36 per cent of the dry weight, of which 3.51 per cent was neutral fat and 8.85 per cent was essential lipid. Of the dry weight, 0.53 per cent was cerebrosides, 0.99 per cent was free cholesterol, 0.54 per cent was cholesterol esters, and 6.79 per cent was phospholipid. Cephalin averaged 2.26 per cent of the dry weight of the placentas, lecithin was 3.55 per cent, and sphingomyelin was 0.98 per cent.

NOTE.—The third contribution, dealing with the vitamin content of the human placenta, will be included in the next issue.

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AN UNUSUAL CASE OF HOLOACEPHALUS

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ON JANUARY 12, 1946, a 17-year-old, white primipara was admitted as a patient to the obstetric department of St. Mary's Hospital. The patient's last menstrual period had been June 18, 1945. She was having moderately strong contractions which had begun six hours before. Membranes were intact and there was no hemorrhage. Fetal heart tones, heard in the right lower quadrant, were 130, and of good quality. When the cervix had 6 centimeters dilatation, a breech presentation was definitely determined. Fetal heart tones remained 120 to 130, and of good quality. Six hours after her entry into the hospital, the patient delivered spontaneously a male child as a frank breech, in right sacroanterior position. The fetus was completely acephalic, with a large dark blood clot adherent to the neck. The color was good. The cord was pulsating, and there was no evidence of twisting or knotting. The baby's heart was beating forcibly. After approximately four or five minutes the cord was clamped, tied, and cut. The heart continued to beat for another five or six minutes; the beats became gradually weaker, and finally "death" occurred, The third stage of labor was uneventful. The cord was normal in appearance and length. Hemorrhage amounted to about 150 c.c. Vaginal examination at this time, and x-ray of the pelvis later, failed to reveal any evidence of retained or old unabsorbed bony elements.

The patient's childhood history was essentially negative. Diagnosis of pregnancy was first made four months prior to her entry into the hospital, when the patient underwent an operation for acute appendicitis. The day after this operation she noted slight, dark red, vaginal spotting, which lasted for five or six days, and then stopped completely. After the operation, she noticed transient "nagging backache" in the left lumbar region; this occurred two or three times a week and was brought on by standing for long periods. Menstrual history of the patient was essentially negative, except for rather severe dysmenorrhea the first two days of the period. Four months prior to the estimated date of the last menstrual period, the patient states she was under treatment for mild hypothyroidism and functional amenorrhea. The missed period which signalled onset of the pregnancy was mistaken by the patient as a symptom of her hypothyroidism.

Physical examination revealed no abnormalities.

The patient's husband, 19 years old, had essentially negative past history. His mother had ten children, two early abortions, and one premature child who died after two weeks of life. His sister had had three premature deliveries; two of her children are living and well, and one is a 13-year-old idiot now in an institution. The mother of the patient has two children, both living and well; she had no abortions.

Autopsy of Fetus.—The body was that of a 7½ months' premature male infant, born completely without a head. The body measured 30 cm. in length, and weighed 1,110 grams. External examination revealed an appendage of skin covered with hair and measuring 7 cm. in length and 2 cm. across. This appendage arose from the right side of the stump of the neck; it was soft and

Fig. 1.—Gross specimen.

Fig. 2.—Anteroposterior views of fetus. Note that bony structure is completely normal except for absence of first cervical vertebra.

contained no bony structure. In the upper anterior aspect of the neck stump there was a 2 cm. aperture through which opened a normal trachea and esophagus. The extremities were normally developed and presented bilateral talipes equinovarus. The back was normal; external genitals revealed testes absent from the scrotum.

Thoracic cavity: The pleural cavity contained nonaerated, collapsed lungs. The trachea and bronchi were normal. A moderately large thymus gland was overlying the trachea. The heart was normal in size, shape, position, etc. Myocardium and valves were normal. There was a patent ductus arteriosus and a closed foramen ovale.

Abdominal cavity: The liver, spleen, pancreas, gastrointestinal tract, and kidney-ureter-bladder tract were all normal in size, shape, position, etc. The adrenals were not defined, but a mass of tissue scattered retroperitoneally on the under surface of the kidney was thought to be adrenal tissue; no definite cortex or medulla was noted. The testes and associated structures were found in the abdominal cavity.

Spinal cord: The spinal cord was dissected out in an attempt to determine if any brain tissue was present in the cephalic end of the cord. Examination revealed normal appearing cervical enlargement and apparently normal spinal nerve roots. Grossly, there was no evidence of midbrain structure on section of the spinal cord. The meninges were intact and the cephalic end of the cord simply tapered off to the end of the closed vertebral canal at the level of the sixth cervical vertebra.

It was attempted to establish the possibility of intrauterine amputation by determining the origin and insertion of the larger neck muscles and tracing the coratid vessels. The only definite information obtained was that the trapezius muscle had normal origin and insertion, and that the three main vessels arising from the arch of the aorta were normal. Dissection of the distal portion of the internal carotid artery and jugular vein failed to reveal any definite terminus or demonstrable communication between arterial and venous systems.

Microscopic findings: The heart, kidney, pancreas, spleen, and spinal cord revealed no pathology. A section of the skin appendage over the anterior superior trunk revealed only ectodermal structure, no neural elements. The liver showed hemopoetic centers scattered throughout the sinusoids. The lungs showed poor delineation of alveoli. Examination of the pink-tan tissue scattered on the under surface of the kidney and posterior abdominal wall revealed embryonic adipose tissue. There was no chromaffin tissue or definitive adrenal tissue. Examination of the intra-abdominal testes revealed embryonic seminiferous tubules; no pathology was seen.

A review of the literature on acephalus shows this case to be a rare and unusual one. There is apparently no place for it in the usual classification of acephalic monsters. The cases usually reported in literature occur in twin pregnancies, the acephalic monster acting as a parasite and being kept alive by a more or less normal twin.

THE EFFECT OF ESSENTIAL HYPERTENSION ON PREGNANCY

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THE hypertensive pregnant patient can be classified as having either essential hypertension, malignant hypertension, arterial hypertension of known etiology, or pre-eclampsia. This paper is concerned only with essential hypertension discovered during pregnancy, its effect on the health of the mother and child, and upon the mother after termination of such a pregnancy. The pregnant patient with hypertension may ask one or more of the following questions:

1. Will pregnancy aggravate the hypertension?
2. Is the existence of hypertension a sufficient reason for terminating the pregnancy?
3. Will the hypertension influence the health of the child?

The characteristic finding in essential hypertensive disease is an elevation of the blood pressure without any signs or symptoms of renal disease. Dieckmann[1] defines essential hypertension in pregnancy as a state in which "a blood pressure of 140 systolic and 90 diastolic or more exists for two days or longer. This degree of pressure may be present before or during pregnancy and usually persists for six weeks or longer post partum." In this paper we have accepted Dieckmann's definition of essential hypertension as stated here. In many instances, the only sign found was an increased blood pressure. However, it was noted that the patient may have complained also of headache, unusual fatigue, dyspnea on exertion, edema, nocturia, vertigo, or tinnitus. Albumin may have been found in the urine on occasions. The absence of these additional findings suggests that the vascular tree had accommodated itself well to the elevation of blood pressure.

Materials and Methods

In a series of 3,000 patients delivered consecutively in the Hospital of the University of Pennsylvania, there were 115 women who showed essential hypertension, as indicated by the fact that their blood pressures were 140/90 or higher on two or more prenatal visits. These patients were followed regularly throughout their pregnancies, with observations being made as to the onset of any new symptoms and the ranges of their blood pressures. The type of labor and delivery was noted in each case with particular reference to the condition of the infant at birth. A six weeks' postpartum examination was made on 90 of the 115 women.

Observations

First Prenatal Visit.—The time of the first prenatal visit varied from the third to the eighth month. The majority of patients were seen for the first time during the fourth month of their pregnancies. On the first visit 60 of the 115 patients had a normal blood pressure but later developed essential hyperten-

sion, while 55 women exhibited hypertension on their first visit. Of this latter group, 38 had had one or more previous pregnancies; the remaining 17 were pregnant for the first time.

Table I summarizes the range of the blood pressure of these two groups on their first prenatal visits.

TABLE I. RANGES OF BLOOD PRESSURES ON THE FIRST PRENATAL VISIT

BLOOD PRESSURE	PAROUS	NULLIPAROUS	TOTAL
Under 140/90	41	19	60
140-149	13	9	22
150-159	10	3	13
160-169	8	2	10
170-179	2	1	3
180-189	0	0	0
190-199	3	1	4
200 - over	2	1	3
Total	38	17	55

TABLE II. AGE DISTRIBUTION OF THE 115 PAROUS AND NULLIPAROUS PATIENTS

AGE	PAROUS	NULLIPAROUS
15 - 19	0	2
20 - 29	16	22
30 - 39	59	12
40 - 49	4	0
Total	79	36

The majority of instances of hypertension in the parous group occurred between the ages of 30 and 39, while in the nulliparous group the greater number was between 20 and 29 years of age.

Of the 79 parous patients, 43 had hypertension prior to the present pregnancy, 14 were normal on their first prenatal visit, and 18 had no previous record. Four patients had suffered from previous pre-eclampsia with a resultant increase in blood pressure early in this pregnancy but with no recurrence of pre-eclampsia or eclampsia.

Prenatal Course

During the prenatal course, 52 of the 115 patients experienced albuminuria of varying degrees, the majority exhibiting only a trace. The remaining 63 were free of albumin. Two women showed impaired renal function as pregnancy progressed; six had only slight involvement, as shown by lowered urea clearance tests. The symptoms of headache, vomiting, and edema occurred with the same frequency as in normal pregnancy. The eye grounds of 33 patients were examined. Twenty-one were found to have early sclerotic changes with some spasm, two showed marked arteriosclerosis, and ten were normal. One patient had an abruption of the placenta in the eighth month of pregnancy.

Eight patients experienced blood pressures of at least 200/100 at some time during their pregnancies. Four of these individuals had their pregnancies interrupted either by therapeutic abortion or hysterotomy. The remaining four delivered normal infants at term. Eleven patients had blood pressures between 190/100 and 200/100. Nine delivered normal infants, one aborted, and one delivered a stillborn child.

Influence of Hypertension on Fetal Mortality

Of 2,885 pregnancies not associated with essential hypertension, 737 (25 per cent) ended in either abortion, premature birth, stillbirth, or neonatal death. Of 115 pregnancies in patients with essential hypertension, 20 (17 per cent) ended in this manner. Table III shows these distributions.

TABLE III. FETAL SALVAGE IN RELATION TO ESSENTIAL HYPERTENSION

	PREGNANCIES			
	NOT ASSOCIATED WITH ESSENTIAL HYPERTENSION		ASSOCIATED WITH ESSENTIAL HYPERTENSION	
	NUMBER	PER CENT	NUMBER	PER CENT
Total Conceptions	2885	100	115	100
Abortions	340	11.8	4	3.0
Premature Births	273	9.5	12	10.4
Stillbirths	56	1.2	3	2.6
Neonatal Deaths	68	2.3	1	0.8
Total	737	24.8	20	16.8

Note that the incidence of abortion, premature births, stillbirths, and neonatal deaths was less in the presence of hypertension than in its absence.

Maternal Outcome

There were no maternal deaths among the 115 hypertensive patients before the six weeks' follow-up examination. Of 90 women who were checked at this time, one-half showed a return of the blood pressure to normal.

Discussion

Will pregnancy aggravate a hypertension? Fifty-five of the patients exhibited an increased blood pressure on their first prenatal visit. Thirty-seven of these experienced an increase in pressure as pregnancy progressed, while the pressure of 18 remained unchanged. The fact that 60 patients entered pregnancy with a normal blood pressure and later showed an increase would lead us to believe that pregnancy does influence the hypertensive state. This increase was not permanent in all of them since the blood pressure of 50 per cent of the 90 patients followed returned to normal within six weeks of delivery, nor was it detrimental to the mother's health. There were no maternal deaths, and the only complication was an abruption of the placenta. This series is being followed so that a report may be made in 3 to 5 years after delivery. Such results might then be compared with Herrick and Tillman's[2] study where 15.7 per cent of maternal deaths occurred in a period of five years and eight months.

Is the existence of hypertension a sufficient reason for terminating the pregnancy? In observing hypertensive patients, one's attention is always called to the possible damage which has occurred, or is occurring, to the vascular or renal systems. Laboratory tests previously disclosed no facts of value in this connection because there was rarely enough damage to be demonstrated by such methods. Dieckmann states that the height of the blood pressure is out of proportion to the amount of edema and albumin present. Renal function is normal, and the eye grounds are normal or show a slight narrowing of the arterioles. Also, Crabtree[2] states that clinical findings in benign hypertension during pregnancy are essentially those of the nonpregnant state. Dexter and Weiss[3] noted that the amount of albuminuria gave no indication as to the course of the disease in pregnancy. It is only in severe cases of hypertension that any impaired renal function or marked eye ground changes are to be observed. The majority of patients experienced no damage to their renal and cardiac systems from repeated pregnancies. Two patients were known to have impaired kidney function; several showed some early retinal changes; the remainder revealed

no abnormalities in either their renal or cardiac systems or in their eye grounds. Our laboratory studies agreed with the findings of Dieckmann, Crabtree, and Dexter and Weiss. Therefore, the clinician must treat these patients according to the signs and symptoms they present, rather than wait for positive findings from the laboratory.

Marked increases in blood pressure were seen in 2 patients in this group. One patient, whose initial blood pressure was 140/80, reached 240/130 at term. The other woman started pregnancy with a blood pressure of 150/100, which ultimately reached 200/130. Both these patients came through their labors well and delivered normal full-term infants. In addition to these, six women in our series had blood pressures over 200/100. Four of these patients had their pregnancies interrupted, while two delivered normal infants at term. We believe, therefore, that pregnancy will aggravate an existing hypertension, but usually does so with no demonstrable injury to the mother's health.

We do not feel that there is enough significant damage to the patient's cardiac or renal systems to warrant interrupting a pregnancy merely because of the elevation of blood pressure or because of the appearance of a small amount of albumin. There being no maternal deaths in this series and only one case of abrupted placenta, it would seem that such accidents rarely accompanied the hypertensive state. If, however, one does find marked eye ground changes or impaired cardiac or renal function, the possibility of interrupting that pregnancy should be considered.

Will the hypertension influence the child? Dexter and Weiss[5] studied 20 infants of hypertensive mothers. Five were premature and two were stillborn. They, therefore, advised the interrupting of pregnancy as near as possible to the thirty-second week in order to reduce the incidence of stillbirths. Dieckmann[3] states that in his series of pregnancies 21 per cent of infants died. In Browne and Dodds' series[6] of 239 pregnancies, 36.5 per cent of infants failed to survive. We have not found that maternal hypertension influences the infant to such a degree. The incidence of abortions, premature deliveries, and stillbirths in our hypertensive patients was not significantly increased. Our fetal death rate was 17 per cent; while Dieckmann and Browne and Dodds had 21 and 36.5 per cent, respectively.

Summary

It is our belief, therefore, that the presence of a high blood pressure in a pregnant patient who shows normal laboratory findings, but who may have some albuminuria, edema, or headaches, should not contraindicate the carrying of such a pregnancy to term. A few additional precautions, such as bed rest, control of the patient's weight, and sedation, are helpful. Any marked increase in the severity of the symptoms should be investigated for the possibility of an acute progression of the disease, although in our experience this has been negligible. The patient should be informed that the possibility of fetal complications is no greater than in the absence of hypertension. Persons who are desirous of having one or two children should be told that, with adequate prenatal care, the possibilities of delivering a normal healthy infant are good and

that there is little danger of any maternal accident. A permanent increase did occur in the hypertensive state in 45 of the 115 patients. This increase did not appear significant and seemed in accord with the rise that would occur naturally as the course of the disease.

Conclusions

1. Pregnancy aggravates the hypertensive state both in parous and nulliparous individuals.

2. The existence of hypertension itself is not sufficient reason for terminating the pregnancy.

3. The fetal death rate is not increased in the presence of essential hypertension.

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GRANULOSA-CELL TUMOR OF THE OVARY*

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GRANULOSA-CELL tumors of the ovary have been thoroughly studied recently by several investigators (Dockerty,[3] Bland[2]). Much of the work has dealt with a review of old pathologic material to which have been added new cases. The literature reveals but a few instances where the diagnosis of this tumor was made preoperatively. The following case seemed worthy of addition to the growing list of these interesting tumors, not only because of their relative rarity (1.63 per cent of ovarian tumors as found by Hodgson, et al.[7]), but because of the clinical history which led to the correct clinical diagnosis before operation.

Although granulosa-cell tumors were described almost a hundred years ago,[10] over one-half of approximately 500 cases have been recorded in the literature in the past decade. Robert Meyer,[8] must be given the credit for the awakening of interest in this gynecologic entity which has received more attention during the past five years than any other ovarian tumor. As to the histogenesis as promulgated by Meyer, these tumors presumably arise from granulosa-cell rests in the hilus of the ovary. This is now at variance with views held by recent observers. Furth and Butterworth[6] have produced granulosa-cell tumors in mice by the use of the x-ray. Biskind and Biskind[1] feel that the pituitary plays a part in the process.

Clinically, over 50 per cent of these tumors occur during the childbearing period;[3] 5 to 10 per cent, before the age of puberty; the rest, after the menopause. In children, the symptoms are mainly those of precocious menstruation and somatic development. Amenorrhea, menorrhagia, or metrorrhagia may be encountered during the childbearing period. After the menopause, the most common symptom is cyclic bleeding. Enlarged and painful breasts also may be encountered. According to Dockerty,[3, 4] amenorrhea ascribed to the menopause may be the first symptom of a granulosa-cell tumor. Assays of blood and tumor tissue in humans and in animals with experimentally produced tumors have shown large amounts of estrin to be present.[2, 3] The symptoms produced by these tumors are referable to the increase in this hormone.

Pathologically, the tumor shows considerable variation in its gross and microscopic appearance. It may be only a few millimeters in size or it may be large enough to occupy most of the abdominal cavity. The surface is usually smooth, and, like most ovarian tumors, it is oval or round. The cut surface reveals a solid tumor, but it may become cystic as it enlarges. It is often associated with cysts of the ovary. Its color is distinctly yellow, which helps to distinguish the tumor from other ovarian neoplasms.

The histologic structure of a granulosa-cell tumor is also quite varied. The tumor cells may be arranged into many patterns, giving rise to the many descriptive terms, such as *folliculoid, cylindromatous, pseudo-adenomatous,* and *parenchymatous.*[9] In some tumors the cells are irregular, pleomorphic, and anaplastic, and may well be mistaken for a sarcoma. On the other hand, many are well differentiated and are relatively benign. The tumor is essentially a carcinoma with all its inherent gradations of malignant possibilities. In about 10 per cent of the cases the tumor is bilateral.[5] It spreads by local extension and metastases in the liver, pleura, and meninges.

*Dr. M. B. Dockerty of the Mayo Clinic gave valuable assistance and advice in the preparation of this paper.

Case Report

Mrs. A. W., a 55-year-old white housewife, gave the following history: In 1942 she began to experience climacteric symptoms in the form of hot flashes, nervousness, and irregular menstrual periods. In May, 1944, at the age of 54 years, the menses ceased altogether. In February, 1945, at the age of 55 years, after a period of amenorrhea of nine months' duration, she noted onset of intermittent vaginal bleeding and soreness of the breasts for a period of two weeks. She also became aware of a swelling in her abdomen which was notably tender, and she thought that she might be pregnant.

In March, 1945, while lying on her abdomen and reaching for a toy under the sofa, she had a sudden excruciating pain in the right upper quadrant and in the right shoulder, accompanied by abdominal swelling. The pain lasted throughout the day and was relieved only by a narcotic. After five days the abdominal pain and swelling subsided. She was informed by her physician that she had a pelvic tumor and was referred to the gynecologist for diagnosis and treatment.

Her complaints at the time of consultation were tiredness, nervousness, and slight abdominal pain. During the following month there was a recurrence of the bleeding, profuse enough to require two or three sanitary napkins daily. She experienced the same sensations as those which accompanied her previous normal menstrual periods.

Her family history was irrelevant. She had the childhood diseases of measles, mumps, and scarlet fever. Her menarche began at the age of 14 years. The menstrual periods were normal and regular until the appearance of the menopausal syndrome. She was operated upon at the age of 17 years, when the appendix and a right ovarian tumor were removed. The nature of this tumor could not be ascertained. Her obstetric history revealed that she was a gravida iii, para ii. with one miscarriage at four and one-half months.

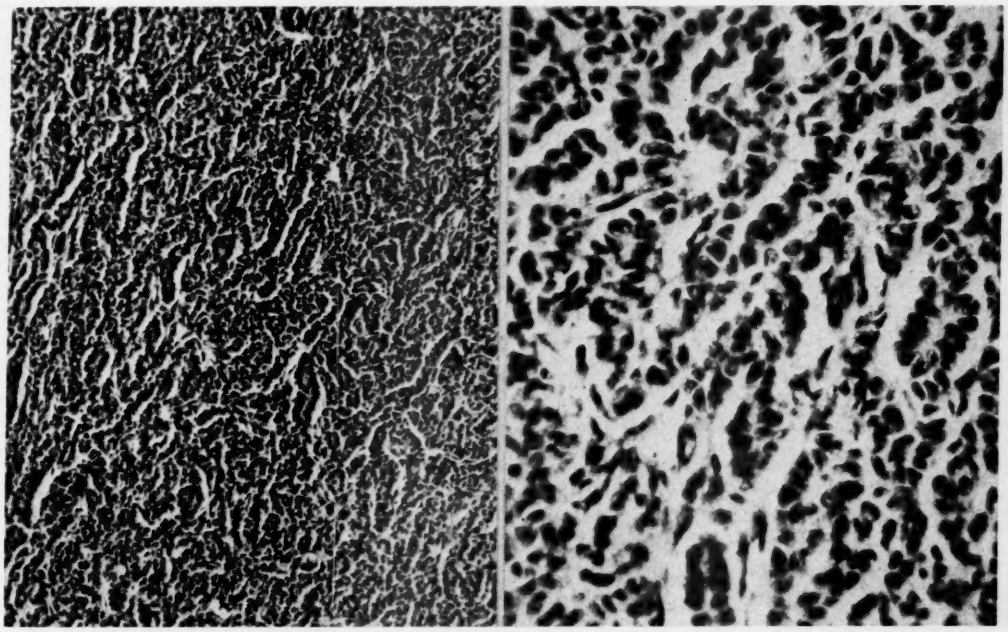
The physical examination revealed a small, slender woman of about the stated age and weighing 100 pounds. The temperature, pulse, and respirations were normal. The blood pressure was 108/80. The circulatory, respiratory, and alimentary systems showed no significant changes. The pelvic examination revealed a clean lacerated cervix. The uterus was situated anteriorly, was freely movable, regular in contour, and normal in size and consistency. The right adnexus was uninvolved. The left adnexus contained a cystic, semisolid mass about the size of an orange. Upon the strength of the history and physical findings, a diagnosis was made of a left ovarian tumor, probably of the granulosa-cell type.

An operation was performed on April 24, 1945, under cyclopropane and ether anesthesia. The abdominal cavity was found to contain approximately two liters of serosanguineous fluid. The origin of this fluid was apparently a large collapsed cyst which was attached to a multilocular mass in the left adnexus. The uterus and left tuboovarian mass were removed (the right ovary had been removed at the age of 17 years).

The postoperative course was characterized by a daily elevation of the temperature to 100° F. for four days. The remainder of her convalescence was uneventful. She was discharged on the twelfth postoperative day in a satisfactory condition.

The laboratory data revealed a hemoglobin of 11.3 Gm. red cell count of 4,330,000, and a white cell count of 7,000. The polymorphonuclear neutrophiles were 67 per cent; lymphocytes, 30 per cent; monocytes, 2 per cent; and eosinophiles, 1 per cent. The coagulation time was four minutes, while the bleeding time equaled two and one-fourth minutes. The sedimentation rate was 16 mm. in one hour. Serologic tests for syphilis were negative. The urine contained nothing of significance.

Pathologic report.—Specimen consisted of a totally resected uterus and a collapsed cystic tumor of ovarian origin. The uterus measured 8 cm. in length and 6.5 cm. in diameter across the fundus. It weighed 93 Gm. The cervix had been previously sutured. The cervical canal showed no special changes other than a few small retention cysts. The myometrium was of normal appearance and measured 1.8 cm. in thickness. The tumor had been previously sectioned and consisted of a collapsed amorphous cyst showing considerable distortion. A Fallopian tube on its surface could not be demonstrated. On sectioning, the tumor was composed of a cystic portion which, on reconstruction, measured approximately 9 cm. in diameter. Its lining was smooth and somewhat wrinkled. A small daughter cyst was filled with blood. The other half of the tumor was solid, and was composed of moist, structureless tissue having an intensely yellow color. Its consistency was rather soft. A few small hemorrhagic areas were scattered within the mass. The tumor was surrounded by a narrow shell of what appeared to be normal ovarian tissue.



Figs. 1 and 2.—Photomicrographs (×150 and ×530, respectively) stained with hematoxylin and eosin; and showing the typical cellular arrangement of the granulosa-cell tumor removed from the patient.

Microscopic examination of the sections stained with hematoxylin and eosin and taken from the solid portion of the tumor, revealed a solid pattern of hyperchromatic cells arranged mainly in rows supported by fine strands of connective tissue and capillaries. This basic pattern was cylindromatous, and it was partly disrupted by the formation of clusters of cells surrounding small cystic spaces. The latter appeared to be produced by liquefaction and resembled somewhat the so-called Call-Exner bodies, rather than the rosette arrangement of cells surrounding a lumen. Under higher magnification, the cells appeared to be of the granulosa type. Their nuclei were hyperchromatic and stained uniformly. The nucleoli were visible, but were not outstanding. Mitotic figures were extremely scarce. Where the cells were not so crowded, a definite rim of eosinophilic cytoplasm could be seen. Sections from the wall of the larger cyst showed a thick fibrous wall lined by a wide zone of granulosa cells having a pattern similar to that of the solid portions of the tumor.

Sections of the endocervix showed relatively few glands. Some were mainly of the simple variety. There was some variation in their size, and some had a cystic dilatation. A few had a tendency to coil. The glands were lined with columnar epithelium. The majority of the nuclei were basal in location, and a fair number were in mitosis. The cells of the interglandular stroma were closely packed at the base, but were loosely arranged near the surface. Mitotic figures also were encountered here. The blood supply appeared adequate. Many of the capillaries were distended with blood. The endometrial picture was compatible with that described by others in connection with granulosa-cell tumors.

The myometrium presented no distinctive features. Connective tissue increase was not apparent. The blood vessels showed no definite changes.

Diagnosis.—Granulosa-cell tumor of the ovary (cylindromatous type); hyperplasia of the endometrium; cystic cervicitis.

Figs. 1 and 2 show a typical pattern of the tumor at various magnifications.

Discussion

The symptom of amenorrhea may have been the first sign of the presence of a granulosa-cell tumor. The episodes of uterine bleeding have been explained on the basis of a "withdrawal" phenomenon of estrogen level in the blood circulation due to changes in the tumor.

The rupture of the cystic tumor is not a common occurrence. In a different type of ovarian malignancy, such a rupture would invariably disseminate the growth throughout the abdominal cavity. The pain, with its distribution, no doubt, was due to peritoneal and diaphragmatic irritation.

Associated pathologic changes are usually present with a granulosa-cell tumor. As in this case, cystic endometrial hyperplasia is to be expected. Fibromyoma, adenomyoma, and general uterine hypertrophy are commonly found. Carcinoma of the endometrium and endocervix, as well as hyperplasia, fibroadenoma, or carcinoma of the breasts may be encountered also.

The management of a granulosa-cell tumor calls for conservatism in the young patient and radical treatment in the old, as was followed in this case. This patient was alive and well one year after the removal of the tumor. Periodic examinations for detection of possible recurrences should be practiced, particularly where there is a history of rupture.

Summary

A case of granulosa-cell tumor of the cylindromatous type has been reported. The patient, a 55-year-old woman, had clinical symptoms and physical findings sufficiently characteristic to suggest the diagnosis preoperatively. A brief consideration of the incidence, histogenesis, and pathology has been presented.

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LIPOMAS OF THE BROAD LIGAMENT EXTENDING BEYOND THE CONFINES OF THE PELVIS

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A RETROPERITONEAL lipoma is an uncommon finding; moreover, the occurrence of a lipoma in the broad ligament is even more unusual. Lipomas of the broad ligaments are of interest because of the gynecologic diagnostic problem that they may present, the difficulty that surgical extirpation may pose and the problem that is raised by an occasional recurrence. Our interest was aroused in these tumors after we had had occasion to remove lipomas arising in the broad ligament in two patients. In one patient the lipoma presented in the perineum and in the other the lipoma presented in the medial aspect of the buttock, making an exit from the pelvis through the right obturator foramen.

In 1932, Bettman and Serby[1] reviewed 307 cases of retroperitoneal tumors found in the literature, the majority of which were proved lipomas or liposarcomas. In 1942, Neale[5] reviewed the cases in which retroperitoneal tumors had been removed surgically at the Mayo Clinic prior to that time. He found 22 of the tumors to have been lipomas, and an additional 32 to have been liposarcomas. A follow-up of the 22 patients who had had lipomas revealed that five had died in the immediate postoperative period, eight had died of subsequent recurrence, one had died of myocardial failure, and eight were alive and well. A follow-up of the 32 patients who had had liposarcomas revealed all to have died. Four died immediately after operation, and the remainder died ten months to ten years after operation; only two patients lived more than four years. All deaths were attributed to recurrence of the tumor. The retroperitoneal lipomas reported in this study had usually enlarged to a considerable size before the patient or the physician discovered the presence of the tumor mass. The high surgical mortality rate is to be attributed to the largeness of the tumors as well as to the vigorous bleeding encountered when they were dissected free from the attachments to the mesentery of the large and small bowel, as well as to the large blood vessels.

In 1939, Stagg and Hunter[8] reviewed the cases of lipomas of the broad ligament that had been reported in the literature. They reported two cases and found 14 others, two of which Lockyer[4] regarded not as true neoplasms, but rather as fatty material that had spilled from a dermoid cyst. This would make a net total of 14 cases of true lipomas of the broad ligament that have been reported. Cases have been reported by Pollock[6] in 1852, Klein[3] in 1909, Lockyer in 1919, Rawls[7] in 1926, and Kantner[2] in 1935. We have been unable to find additional reports of cases following those of Stagg and Hunter. Probably other cases have occurred but have not been reported in the literature because it was considered that these tumors are benign. In the cases reported, lipomas occurred in the right broad ligament in four, in the left broad ligament in three, they were bilateral in three, and the site was not reported in four. Preoperatively, the majority had been thought to be ovarian cysts. In no case did the lipoma extend beyond the confines of the pelvis.

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In reviewing the records of the Mayo Clinic we have found five cases in which lipomas have been removed surgically from the broad ligaments. Two of these we wish to report in detail.

Report of Cases

CASE 1.—The patient was a 36-year-old white woman admitted Sept. 17, 1935, with a mass in the right perineal region the size of a large grapefruit. This mass had been enlarging for four years. It could be palpated as it bulged into the right side of the vagina and rectum and as it extended into the right labia and right buttock. The mass was reducible but recurred with coughing or straining. It had caused the patient intermittent hesitancy of urination. Because of its consistency and location this mass was thought to be a perineal tumor which had arisen in the right broad ligament.

The patient had always been in good health, except for an attack of influenza in 1918. Both parents and three brothers were alive and gave a history of good health. She had undergone three normal pregnancies and deliveries. Her menstrual periods were regular, occurring approximately every twenty-eight days and persisting for three or four days. Examination of urine for albumin, sugar, bacteria, and microscopic cellular elements gave negative results. The concentration of hemoglobin was 14.9 Gm. per 100 c.c. of blood. There were 8,300 leucocytes per cubic millimeter of blood. A roentgenogram of the thorax was negative and a Kahn test gave negative results. The blood pressure was 128/84. The temperature was 99.4° F., and the pulse 86. The patient was 65 inches (165 cm.) tall and weighed 100 pounds (45.4 kg.). The remainder of her physical examination did not reveal any abnormalities.

On Sept. 20, 1935, while the patient was under nitrous oxide, oxygen, ether, and ethylene anesthesia, a low midline incision was made. A large fibromyxolipoma presented in the right broad ligament and extended along the right side of the vaginal canal to present in the perineum anterior and to the right of the vagina. An incision was made on the posterior surface of the right broad ligament and the tumor was removed. Subtotal abdominal hysterectomy, bilateral salpingectomy, and left oophorectomy were carried out. The right ureter was freed and brought anterior to the cervical stump, which was then used to block the opening through which the tumor had descended. The appendix showed evidence of previous inflammation and was removed. The incision was closed with one row of single continuous chromic catgut No. 1 in the peritoneum and a row of double continuous chromic catgut No. 1 in the fascia. The pathologist reported the tumor to be a fibromyxolipoma weighing 500 Gm. Chronic metritis and bilateral chronic salpingitis were present. When the patient was dismissed to go home on the twenty-first postoperative day she was in good general condition and the incision was well healed.

The patient returned July 8, 1936, with a recurrence of a mass of almost the identical size located at the previous site. This was removed through a perineal incision while she was under cyclopropane, oxygen, and carbon dioxide anesthesia and in a lithotomy position. The tumor was firmly adherent to all the surrounding structures, to the base of the bladder, and to the right side of the vagina. Oozing of blood was difficult to control, and a large iodoform pack was required to control it. The pathologist reported the tumor to be a fibromyxolipoma weighing 500 Gm. The pack was removed on the sixth postoperative day. When the patient was dismissed to go home on the seventeenth postoperative day, the incision was well healed.

The patient again returned Aug. 7, 1941, stating that a recurrence of the perineal mass had been slowly developing for two years, and that enlargement had been rapid in the preceding six months. On Aug. 9, 1941, while she was

under nitrous oxide, oxygen, and ether anesthesia, a secondary low midline incision was made. A true hernia with an opening through which the fist could pass was found on the right side of the pelvis behind the cervical stump. This opening led to the perineum. There was no recurrence of the fibromyxolipoma. The hernial sac was inverted and excised and the cavity was obliterated by a running purse-string suture. It was thought advisable to remove the cervical stump and right ovary. The sigmoid was used to cover the unperitonized surface on the right side of the pelvis. The pathologist reported chronic cystic cervicitis with cervical erosion and chronic cystic oophoritis of the right ovary. When the patient was dismissed to go home on the twenty-fourth postoperative day, she was in good general condition and the incision was well healed. She was re-examined by us on Sept. 6, 1944, and was found to be without evidence of recurrence of the lipoma or hernia. There was a slight cystocele, but this was not surgical.

CASE 2.—The patient was a 37-year-old white woman admitted July 5, 1945, with a mass 5 inches (13 cm.) in diameter that was presenting midway between the anus and the right ischial tuberosity. This mass had been enlarging for one year. The mass could be palpated as it glided along the vaginal canal. It could be reduced but it recurred with coughing or straining. Sitting for any length of time brought on pain that extended down the back of the right leg and up into the lower lumbar region. The consistency of the tumor was such that it was thought to be a lipoma arising in the broad ligament and leaving the pelvis through the right obturator foramen.

The patient had had a history of rheumatic fever during childhood and had had a peritonsillar abscess on two or three occasions. She had undergone three normal pregnancies and deliveries. Her menstrual periods were regular, occurring approximately every twenty-eight days and persisting about seven days. She had known for three years that she had diabetes mellitus and had controlled it by eliminating starches from her diet. She tested her urine every other day; the tests usually did not show glycosuria. Her mother had died of dropsy at the age of 56 years and her father had died of cardiac disease at the age of 55 years. The patient was 65 inches (165 cm.) tall and weighed 190 pounds (86.2 kg.). The blood pressure was 145 mm. of mercury systolic and 90 diastolic. The temperature was 98.4° F., and the pulse 90. Her physical examinations did not reveal any other abnormalities. Urinalysis revealed a specific gravity of 1.030, acid reaction and albumin grade 2 on a basis of 1 to 4, in which 1 designates the mildest and 4 the most severe condition. Benedict's test for sugar gave slightly positive results and 6 cells per high-power field were observed. The concentration of hemoglobin was 14.0 Gm. per 100 c.c. of blood; erythrocytes numbered 5,330,000, and leucocytes 11,400 per cubic millimeter of blood. The Kahn test gave negative results. A roentgenogram of the thorax was negative. The fasting blood sugar was reported to be 208 mg. per 100 c.c.

On July 14, 1945, with the patient under nitrous oxide, oxygen, and ether anesthesia a primary low midline incision was made with excision of the umbilicus. A lipoma originated in the right broad ligament, extended down the right side of the vagina and made its exit from the pelvis through the right obturator foramen. An attempt was made to remove the tumor from above but some bleeding was encountered and it was thought advisable to close the abdominal incision by bringing the full thickness of peritoneum, muscle, and fascia on the left of the abdomen beneath the full thickness of the right side for 1 inch (2.5 cm.), using a single continuous chromic catgut No. 1 in the first row and double continuous chromic catgut No. 1 in the outer row. The patient was then placed in lithotomy position and a vertical incision was made over the lipomatous

mass about 1½ inches (3.8 cm.) lateral to the anus. A plane of cleavage was found, and a lipoma the size of a large grapefruit was shelled out. Hemostasis was secured and the incision was closed with interrupted catgut sutures in such a manner as to obliterate the space that had been occupied by the lipoma. The incision was closed without drainage and healed by first intention. The pathologist reported the tumor to be a lipoma showing many regions of inflammation and fibrosis. Postoperatively, the patient was placed on a residue-free diet for seven days. The diabetes was controlled with small amounts of protamine zinc insulin and regular insulin for fourteen days, after which she did not require further insulin. When she was dismissed to her home on the nineteenth postoperative day she was in good general condition and both incisions were well healed. A recent communication from her attending physician states that there has been no evidence of recurrence of the lipoma.

The remaining three cases observed were as follows:

In the third case a lipoma measuring 3 by 2 by 1 cm. was removed from the right round ligament of a 32-year-old white woman in the course of subtotal abdominal hysterectomy which was being done for severe menorrhagia.

In the fourth case a small lipoma was removed from the right broad ligament of a 45-year-old white woman in the course of total abdominal hysterectomy for severe menometrorrhagia.

In the fifth case a lipoma having a diameter of 9 mm. was removed from the left round ligament of a 50-year-old white woman in the course of total abdominal hysterectomy for adenocarcinoma of the fundus of the uterus.

Comment

One cannot fail to be impressed by the fact that local recurrence of retroperitoneal lipomas, considered to be benign by the microscopist, is rather common and that in a number of such cases the termination is fatal. There is another reason to view these fatty retroperitoneal tumors with concern, for a high percentage will show sarcomatous tissue present. However, it would appear that lipomas that occur in the broad ligament are, as a rule, of a more benign nature than lipomas in other sites.

Lipomas of the broad ligament are usually diagnosed preoperatively as ovarian tumors. However, in the two cases that we reported, one had to distinguish the lipoma from an obturator hernia, which was made possible by noting the consistency of the mass and the fact that it moved as a distinct unit whenever it was reduced. In deciding on the proper surgical approach for removing such lipomas, one can attempt removal through the approach where the maximal mass of tissue presents; that is, through the abdomen or through the posterior approach. Even then one may find it necessary to change to the alternate approach in order to effect a removal of the tumor.

A site for potential herniation was provided by the removal of the lipomas in the two cases that we have reported. In one instance an attempt was made to prevent herniation by suturing the cervical stump over the defect. Subsequently, following a recurrence of the fibromyxolipoma a true hernia did develop, and this was repaired through an abdominal approach by removing the sac and obliterating the tissue space by purse-string sutures. In the second case, an attempt was made to close the space which the lipoma occupied by approximating the tissues with interrupted catgut sutures.

If a patient has a reducible mass in or near the perineal region, the physician must consider the possibility of its being a lipoma. If this mass can be felt to enter the pelvis, gliding alongside of the vaginal canal, he must consider the possibility of its being a lipoma of the broad ligament extending beyond the confines of the pelvis or an obturator hernia.

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ADULT MEDITERRANEAN ANEMIA COMPLICATED BY PREGNANCY

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MEDITERRANEAN anemia (Cooley's) has long been recognized[1] as a highly fatal disease of childhood. It is characterized by chronic progressive anemia, splenomegaly, reticulocytosis, resistance of red corpuscles to hemolysis by hypotonic saline solutions, lack of response to any therapy, and its familial and racial incidence. The red corpuscles vary greatly in size, contain little pigment, often show basophilic stipling, primitive forms, and target cells. A similar but less severe type of anemia occurring in adults has recently been recognized,[2-4] and a number of cases reported. Some of these cases include more than one generation and reveal a high familial incidence.[5] The case reported here is the only one we know of with the diagnosis being made while the patient was pregnant, and observed during the course of and subsequent to the pregnancy.

The purpose of reporting this case is to direct the attention of obstetricians to the possibility of Mediterranean anemia as a cause of unexplained anemia in the pregnant female and to show the management of such a case which we have followed.

Case Report

CASE 5464.—Mrs. M. D., a 27-year-old Italian-French, married, former Army nurse reported to the Obstetrical Clinic on Nov. 10, 1944.

Family History.—The patient's father was born in Italy, was 53 years of age, and was living and well. Her mother was born in France, and died at the age of 35 years from an unknown cause which had produced high blood pressure and paralysis. The patient had four siblings, three of which were living and well. The fourth had a history of mild anemia and sallow complexion.[6]

Past History.—The patient was born in California, and had had diphtheria in childhood. Sallow color of the skin had been present since childhood. At the age of 12 years noted dyspnea was present, with parietal pressure and a throbbing pain during the day, aggravated by exercise, and becoming constant over a two-year period. Anemia was noted on examination at the age of 15 years, and again at the age of 19 years. Hyperthyroidism (basal metabolism rate +40 to +50) at the age of 16 years was controlled with Lugol's solution and bromides until the age of 19 years, when a thyroidectomy was performed. Anemia during this interval was treated with ferrous sulfate. The patient was told her hemoglobin was low but that the red corpuscles were normal. No history of malaria or jaundice was elicited. The patient had entered and completed nurses' training and entered the Army Nurse Corps. She had coccidioidomycosis at Williams Field, Arizona, in September, 1943, with a normal convalescence. Menses: onset at the age of 12 years, periods occurred every 28 days for five days without dysmenorrhea. Gravida i (present).

Present Illness.—Anemia was present, which was diagnosed at the age of 15 years, as noted above. The patient had been repeatedly examined for anemia and treated with iron, anti-PA liver extract, and diet for many years, never attaining a normal blood picture. No paresthesias, tongue sore-

ness, excessive menses, hematuria, tarry stools, or diarrhea to account for anemia. Last menses occurred Sept. 23, 1944. Slight nausea and vomiting of pregnancy noted.

Physical Examination.—A well-developed and well-nourished young woman with a sallow complexion. Head and neck: mucous membranes pale; tongue papillae normal; thyroidectomy scar present. Heart and lungs: soft apical systolic murmur transmitted to left axilla and precordium; heart size normal by x-ray. Blood pressure: 120/80. Abdomen: Spleen not felt; liver palpable at right costal margin. Extremities: Nails thin and brittle. Neuro-muscular and lymphoid system: Normal. Pelvic: Uterus size of six to eight weeks' pregnancy. Pelvic measurements: Adequate; large gyneco-android pelvis shown by Caldwell-Moloy pelviography.

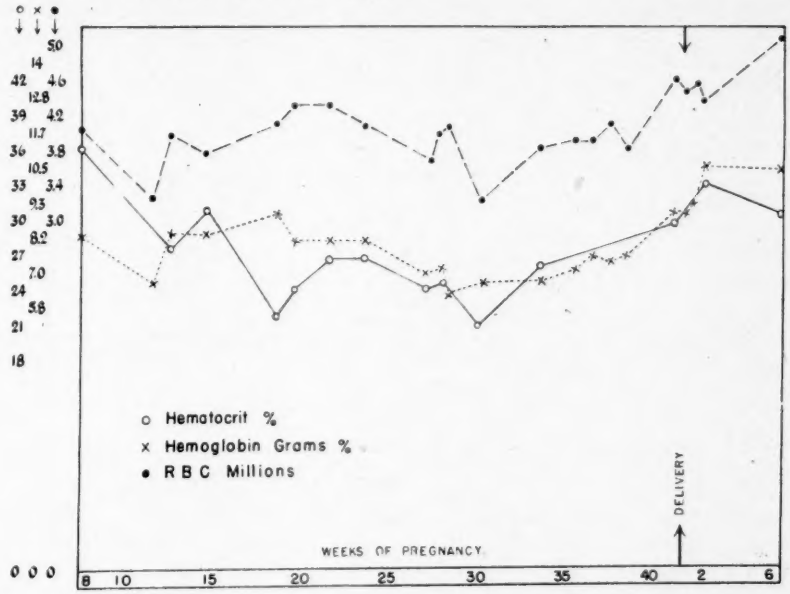

Fig. 1.

Laboratory Investigation and Course.—Obstetrical: the patient progressed normally except for a weight gain from 143 pounds on her initial visit to 187 pounds one week before delivery. Eleven pounds was gained during the last month in spite of rest, salt-free diet, and limitation of fluids. She was hospitalized during the last week with a loss of 8 pounds in weight before going into labor on July 7, 1945. Labor, while not prolonged, was severe. She was delivered by outlet forceps of a 9 pound, 2 ounce female. Postpartum course was uneventful except for a transfusion reaction following delivery consisting of chills and fever. The transfusion was given as a prophylactic measure with cross-matched whole citrated blood. The cause of the reaction was unknown. One week later the spleen was palpable at the left costal margin for the only time during our period of observation, and there was an icteric tinge to the sclera.

Blood Picture.—Blood determinations were taken throughout pregnancy and for one month following delivery (Table I). Kahn: negative. The curves of these determinations are shown in the three charts (Figs. 1, 2, and 3). Reticulocytes were elevated on twelve determinations between 2 per cent and 5.3 per cent, the highest number appearing following an episode of red-blood cell hemolysis on March 26, 1945, as evidenced by symptoms of increased

weakness and fatigue and laboratory findings of icterus index 16, indirect Van den Bergh 3.53 mg. per cent and urobilinogen 4+. White blood cells were normal throughout, varying from 7,000 to 12,000. There were no abnormal-

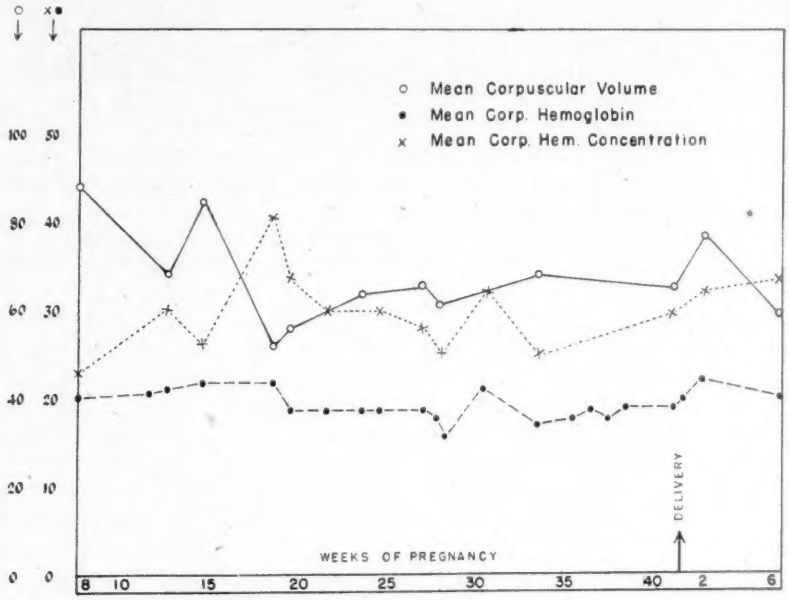
Mean Corpuscular Volume
Mean Corp. Hemoglobin
Mean Corp. Hem. Concentration
DELIVERY
WEEKS OF PREGNANCY
8 10 15 20 25 30 35 40 2 6

Fig. 2.

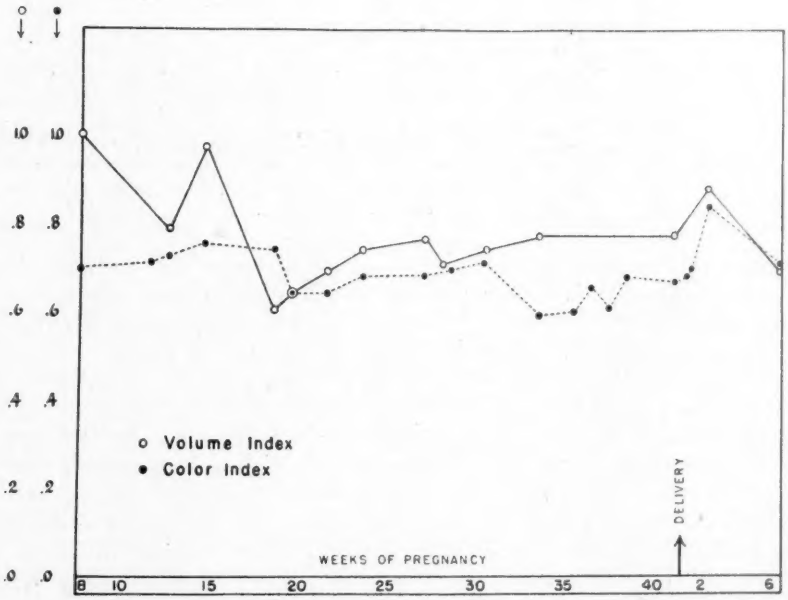

Fig. 3.

ities noted in the leucocytes or in the differential counts on repeated blood smears. But the smears showed many abnormalities of the red corpuscles, including basophilic stippling, target cells, oval cells, poikilocytosis, polychromasia, and anisocytosis. An occasional nucleated red cell was present.

TABLE 1

DATE	RED BLOOD COUNT (MILLIONS PER CUBIC MILLIMETER)	HEMOGLOBIN (GM. %)	HEMATOCRIT (%)	MEAN CORPUSCULAR VOLUME (CUBIC MICRON)	VOLUME INDEX	COLOR INDEX	MEAN CORPUSCULAR HEMOGLOBIN (MICROMICROGRAM)	MEAN CORPUSCULAR HEMOGLOBIN CONCENTRATION (%)
Nov. 10, 1944	4.06	8.2	36.0	88	1.01	0.69	20.20	22.8
Dec. 8, 1944	3.21	6.6	--	--	--	0.71	20.56	--
Dec. 14, 1944	3.97	8.3	27.2	68	0.79	0.72	20.90	30.5
Dec. 29, 1944	3.76	8.2	31.9	85	0.98	0.75	21.80	25.7
Jan. 26, 1945	4.10	8.8	21.4	52	0.60	0.74	21.46	41.1
Feb. 2, 1945	4.26	8.0	24.0	56	0.64	0.65	18.77	33.3
Feb. 16, 1945	4.31	8.0	26.1	60	0.69	0.64	18.56	30.7
Mar. 2, 1945	4.06	8.0	26.2	64	0.74	0.68	19.07	30.7
Mar. 26, 1945	3.65	6.8	24.0	66	0.76	0.64	18.63	28.3
Mar. 30, 1945	3.95	6.9	--	--	--	0.61	17.56	--
Apr. 2, 1945	4.02	6.2	24.7	61	0.70	0.53	15.42	25.1
Apr. 17, 1945	3.20	6.6	20.4	64	0.74	0.71	20.63	32.3
May 10, 1945	3.87	6.6	26.0	67	0.77	0.59	17.05	25.4
May 24, 1945	3.93	7.0	--	--	--	0.61	17.81	--
June 1, 1945	3.92	7.5	--	--	--	0.66	19.13	--
June 7, 1945	4.12	7.3	--	--	--	0.61	17.72	--
June 14, 1945	3.83	7.5	--	--	--	0.68	19.59	--
July 3, 1945	4.63	8.8	29.6	65	0.76	0.65	19.00	29.7
July 7, 1945	Delivery		--	--	--	--	--	--
July 7, 1945	4.42	8.8	--	--	--	0.69	19.91	--
July 9, 1945	4.55	9.2	--	--	--	0.70	20.22	--
July 15, 1945	4.31	10.5	33.0	77	0.88	0.84	24.36	31.9
Aug. 14, 1945	5.10	10.2	30.3	59	0.68	0.69	20.00	33.6

All were noted throughout the course, with stippling occurring in 3.4 per cent of the cells on one occasion. Sickling test using carbon dioxide method was negative on two occasions. Icterus index varied between 7.0 and 16.0 on seven determinations. Van den Bergh indirect varied between 2.0 mg. per cent and 3.53 mg. per cent. Serum protein three weeks before delivery when weight gain was taking place was 7.43 mg. per cent. At this same time serum albumin was 3.70 mg. per cent and serum globulin was 3.73 mg. per cent, giving an albumin globulin ratio of 0.99. Platelets were normal on four determinations as were the bleeding and clotting times, nonprotein nitrogen, blood uric acid, and cold agglutinin tests. Red corpuscle fragility tests on two occasions are shown in Table II.

TABLE II. RED CORPUSCLES FRAGILITY TESTS ON PATIENT

	A) PATIENT	CONTROL	B) PATIENT	CONTROL
Partial hemolysis	0.42%	0.44%	0.36%	0.42%
Complete hemolysis	0.30%	0.36%	0.28%	0.38%

Urine: Negative on all routine examinations. Urobilinogen 4+ found on one occasion but urobilin and bile acids negative at this time. No hemosidrin granules found. Stool: Negative for blood and parasites. Gastric analysis: December, 1944, Ewald test meal: total acid 15.6, free acid none. March, 1945, alcohol stimulation: total acid 7.0, free acid none. July, 1945 (postpartum), histamine stimulation: total acid 60, free acid 48. Basal metabolism rate, +6 and +9.

X-rays: X-ray examination of the femurs revealed decreased width of the cortex in the lower fourth with rarefaction and thinning of the bony trabeculae. Characteristic of chronic anemia. The hands and skull were normal.

Blood count of infant at six weeks: Red blood cells, 3.87 million; hemoglobin, 13 Gm.; white blood cells, 12,400; polymorphonuclears, 37; lymphocytes, 54; mononuclears, 5; eosins, 4. There was an occasional target cell present.

We were able to obtain blood studies of the one sister mentioned above who was also an Army nurse. They were as follows: red blood cells, 5.02 million; hemoglobin, 11.2 Gm.; white blood cells, 7,200; polymorphonuclears, 72; juvenile, 1; lymphocytes, 24; monocytes, 3; platelets, 225,000; icterus index, 7.2; mean corpuscular hemoglobin, 22.3; mean corpuscular hemoglobin concentration, 35; color index, 77; red cell fragility is given in Table III.

TABLE III. RED CELL FRAGILITY TEST ON SISTER

	SISTER	CONTROL
Initial hemolysis	0.38%	0.42%
Complete hemolysis	0.28%	0.36%

Treatment.—Ferrous sulfate up to 4 Gm. daily was started empirically while we were attempting to diagnose the anemia. When it was shown to be of no value in alleviating the anemia, liver extract, using 55 anti-PA units per week for two weeks, followed by 22 units per week for four weeks, was given. This produced no marked reticulocyte response nor rise in either red cells or hemoglobin. Following the first gastric analysis which showed no free HCl and a low total acidity, we gave 90 drops of dilute HCl three times a day. The patient said she noted a relief of the "bloating" she had experienced for a number of years and was enthusiastic about continuing the HCl even after delivery. This may have been psychic but it was the only treatment given which subjectively or objectively benefited the patient. As a matter of fact, she thought our procedure of taking numerous blood samples was hardly the proper treatment for anemia, and she no doubt had a good point. Vitamin B complex and dicalcium phosphate with viosterol were also given.

Comment

For the greater part of pregnancy the values for the hemoglobin and hematocrit readings are low, while the red cells are diminished to a lesser degree. Consequently all the calculations derived from these determinations (mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, volume index, and color index) are low. The curve of the color index, being the mean corpuscular hemoglobin times a factor is identical with the curve of the mean corpuscular hemoglobin. For the same reason the curve of the volume index is the same as the curve of the mean corpuscular volume. There is no constant relation between hematocrit and hemoglobin or between the hematocrit and red cells, except that all three determinations rose during the last week of pregnancy.

The diagnosis of adult type of Mediterranean anemia has been made on the basis of a chronic hemolytic hypochromic microcytic type of anemia not responding to iron, Vitamin B, or anti-PA treatment; red-cell fragility tests, showing increased resistance to hypotonic salt solution; abnormal blood smears as evidenced by the presence of oval and target cells, a high number of cells with basophilic stippling, an occasional nucleated red cell, and an increased number of reticulocytes; positive x-ray changes of the femurs; Mediterranean racial factor with familial trait as shown by the increased resistance to hemolysis in hypotonic solution of the blood of one sister with hypochromic microcytic anemia; lack of sickling of red cells; and the absence of chronic bleeding, hepatic disease, steatorrhea, or lead poisoning. The

anemia regressed moderately at the end of pregnancy as does the "physiologic anemia of pregnancy." The over-all picture appears to be a benign Mediterranean anemia with a "physiologic anemia of pregnancy" superimposed upon it.

Regarding the transfusion reaction, it is known that reactions are more prone to occur in the group of chronic hemolytic anemias.[7]

Our treatment helped diagnose the type of anemia, but following diagnosis it was without proof of benefit. We do not know what would have happened had we given no iron at all, but suspect the anemia may have been more pronounced. For this reason it was continued in large doses.

In considering cases of adult Mediterranean anemia, it must be remembered that these patients are not as severely affected as are the childhood cases. Consequently, the changes in the blood, bones, and spleen are not as marked. Diagnosis in these cases is much more difficult, and in borderline cases more open in criticism.

Conclusion

A case of adult type Mediterranean anemia observed and diagnosed while the patient was pregnant has been presented. Treatment of the anemia following diagnosis was by large doses of iron, although there is no proof of its efficacy. This diagnosis must be considered in cases of obscure anemia, especially in patients of Italian descent.

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PELVIC ENDOMETRIOSIS AS A CAUSE OF HYDRONEPHROSIS*

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THE literature contains many references to pelvic conditions causing obstructive lesions of the upper urinary tract. Among those commonly described are pregnancy, carcinoma of the cervix, uterine prolaps with cystocele, fibromyomas, ovarian growths, and salpingitis. Reports on the effect of pelvic

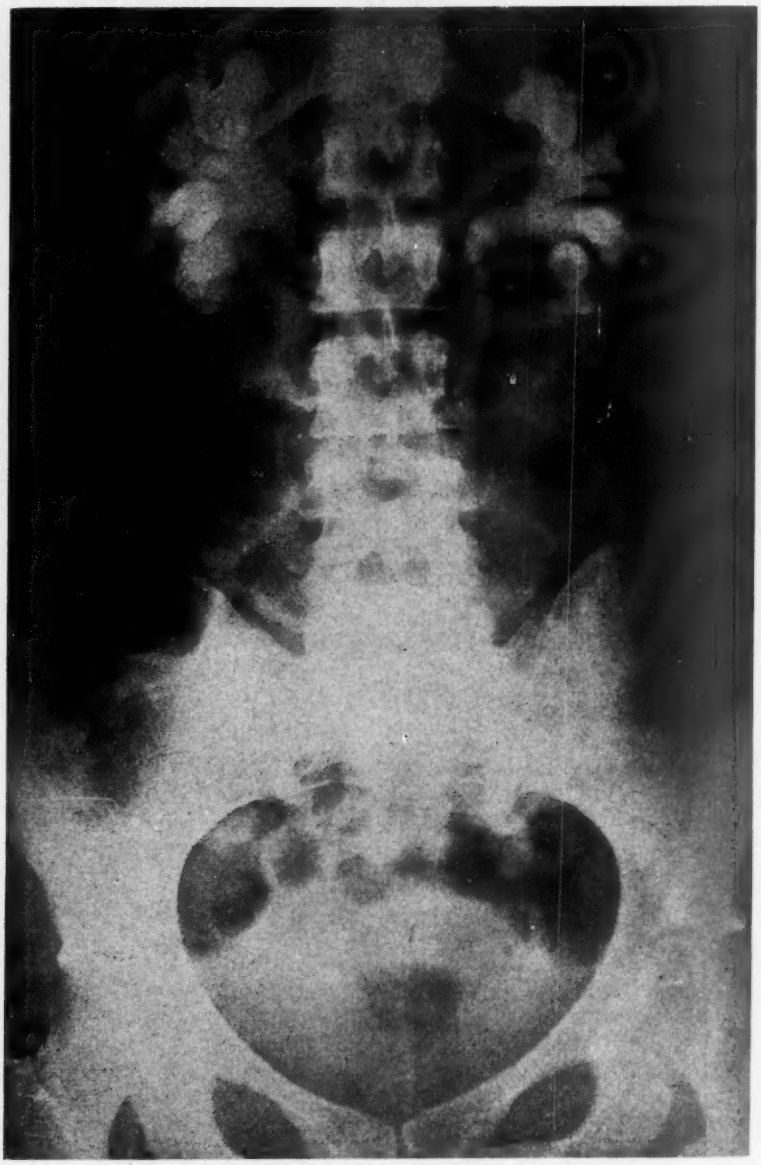

Fig. 1.

*Presented before the meeting of the Chicago Gynecological Society, March 15, 1946.

endometriosis on the ureter are rare. Randall, in 1941, reported a case of primary involvement of the ureter by endometrioma. O'Connor and Greenhill, in 1945, reported the second case of intraureteral endometrioma, and Goodall reported four cases of ureteral involvement. In two of the latter cases death was due to uremic poisoning following profound hydropyonephrosis. Autopsy findings in one of these cases revealed invasion of the lower ureteral walls by the endometrioma so that the lumina were almost completely occluded, though nowhere was the mucosa invaded.

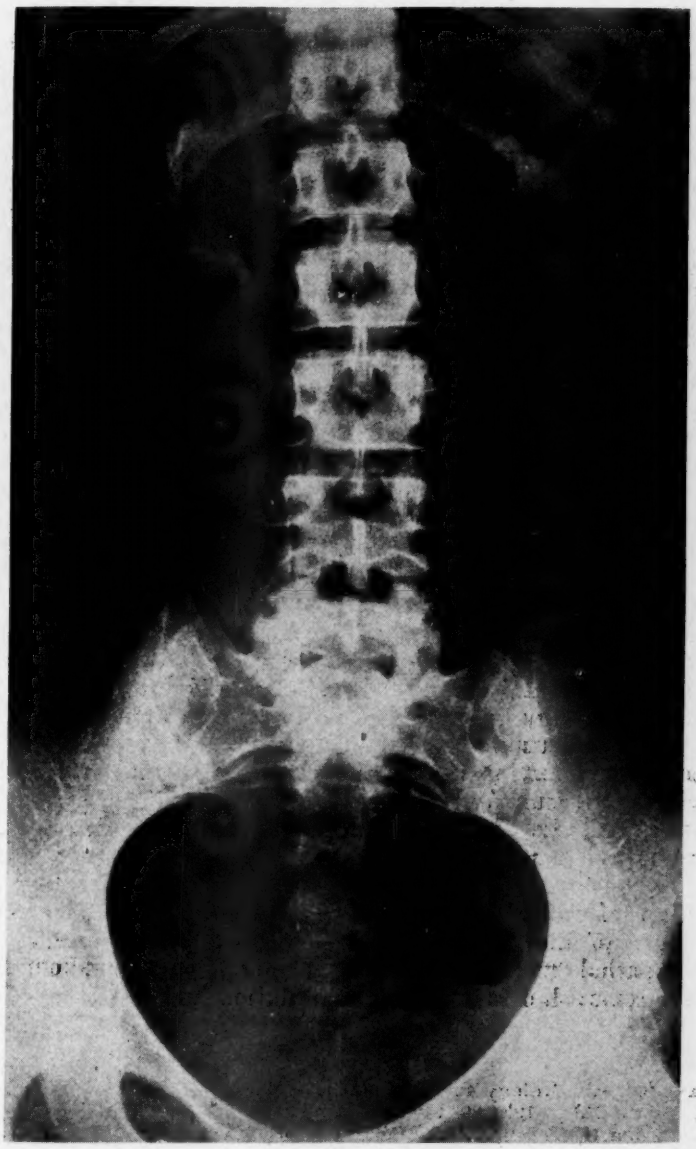

Fig. 2.

The following case report demonstrates constriction of the ureters by pelvic endometriosis with resultant hydroureter and hydronephrosis. This constriction, demonstrated roentgenologically, was released after removal of the instigating cause of the endometriomatous growth, namely, the ovarian secretion.

Miss G. W., a 31-year-old nulliparous Negro woman, entered the gynecologic service on Nov. 27, 1945, complaining of progressively increasing dysmenorrhea for the past six years. During this time the menses recurred every twenty-one days with pain across the lower abdomen, especially marked in the left flank. The pain was associated with nausea and vomiting. Previously, the menses recurred every twenty-eight days and were painless. General physical examination was essentially negative. Rectovaginal examination revealed an irregularly enlarged uterus the approximate size of a six weeks' gestation, hard and fixed in retroversion. In the cul-de-sac and along the uterosacral ligaments were multiple small, hard, fixed tender masses. In the right adnexal region and adherent to the uterus was a firm tender mass. The left adnexae were not palpated. A diagnosis of fibroid uterus and endometriosis was made. Laparotomy was performed on Dec. 1, 1945. The uterus was bound down posteriorly by dense fibrous adhesions. The right-sided mass was a large "chocolate" cyst of the right ovary adherent to the posterior surface of the right broad ligament by dense adhesions. The left tube and ovary were also bound to the left broad ligament by dense adhesions. After liberating the adnexae and freeing the uterus, it was found that the upper rectovaginal septum was markedly infiltrated. The peritoneum of the cul-de-sac and the anterior surface of the rectum were studded with endometriomatous nodules and the entire posterior wall of the uterus, cul-de-sac, and anterior rectum presented a raw, oozing surface. The ureters were markedly dilated and descended in an unusual position along each side of the rectum and disappeared into the dense endometriomatous mass medial to the uterosacral ligaments. Total hysterectomy and bilateral salpingo-oophorectomy were performed. The uterus was removed by opening into the anterior vaginal vault first and then detaching it posteriorly by sharp dissection from the posterior fornix upwards in order to avoid the ureters. Because of the multiple raw surface, peritonealization was accomplished by constructing a "pelvic diaphragm" with the sigmoid sewed to the reflected bladder peritoneum. The extraperitoneal space thus produced was drained through the vagina. On December 8, the seventh postoperative day, intravenous pyelography revealed marked hydroureter and hydronephrosis (Fig. 1). The patient made an uneventful convalescence and was discharged on the eighteenth postoperative day. Intravenous pyelography on Feb. 4, sixty-five days after operation, revealed a return to a normal status of the upper urinary tract (Fig. 2).

The above case illustrates slow constriction of the ureters by endometrioma of the pelvic peritoneum and rectovaginal septum. The ureters in this case were displaced medially. Bilateral hydroureter was demonstrated at operation. An intravenous pyelogram taken seven days following total hysterectomy and bilateral salpingo-oophorectomy showed bilateral hydroureter and hydronephrosis. Follow-up excretion pyelography taken sixty-five days after operation showed a return of the upper urinary tract to a normal status. Cure of the urinary tract pathology was effected by shrinkage of the endometriomatous infiltration after removal of the ovarian stimulation.

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Department of Reviews and Abstracts

Selected Abstracts

Cancer, Malignancies

Daland, Ernest M.: Some Unusual Aspects of Cancer of the Breast, New England J. Med. **233:** 515, 1945.

The author gives a concise summary of the contributions of outstanding surgeons leading to the radical breast mastectomy for carcinoma. Early diagnosis and treatment are essential for the cure in breast cancer. Vague symptoms in the breast, deformity, and lumps must be investigated by biopsy.

Exceptions may be made to performing the radical operation in certain cases, such as sepsis in the cancer, old age, or poor physical condition. Occasionally, but rarely, a five-year survival is obtained by this procedure. Three cases of cancer of the breast in girls under nineteen are reported. JAMES P. MARR.

Brooke, Wallace S., and Thomason, J. R.: Leiomyosarcoma of the Uterus With Metastasis to the Femur, Arch. Surg. **51:** 120, 1945.

The authors deal with sarcoma of the uterus, reporting such a case. Metastases from sarcoma of the uterus are most common in the lungs, peritoneum, lymphnodes, liver, and kidneys. Little has been written concerning metastases of uterine sarcomas to the bone, such as the authors report. JAMES P. MARR.

Recasens Mendez—Queipo de Llano, M.: A Case of Probable Spontaneous Healing of a Chorionepithelioma, Rev. espan de obst. y ginec. **2:** 86-88, 1945.

In the treatment of an incomplete abortion in a 21-year-old patient, chorionepithelioma was diagnosed and radium treatment applied for forty-eight hours. Through accidental circumstances, the x-ray treatment which was to follow was delayed; and when the patient was examined three months later and subsequently, normal function had been restored, and all evidence of the cancer had disappeared. J. P. GREENHILL.

Extrauterine Pregnancy

Clerc, J. P.: Errors in the Diagnosis of Ectopic Pregnancy, Monatschr. f. Geburtsh. u. Gynäk. **118:** 169, 1944.

The author analyzed eleven cases where errors in the diagnosis of ectopic pregnancy had been made. In four cases the ectopic gestations were not recognized and, in the remaining seven cases, ectopic pregnancy was diagnosed in the presence of other conditions. The author emphasizes that in ectopic pregnancy the symptoms are not characteristic. Of the 25 tubal pregnancies operated on every year at the Geneva Obstetric and Gynecologic Institute, errors are made in three or four cases. In doubtful cases exploratory procedures should be carried out. In the four cases erroneously diagnosed in the Clinic, the correct diagnosis was made by means of pelvic puncture. J. P. GREENHILL.

Kaeser, O.: Pregnancy and Rupture in the Scar Area After Salpingectomy With Excision of the Cornu Because of Interstitial Pregnancy, Monatschr. f. Geburtsh. y Gynäk. **195:** 7, 1943.

The author reports a case of ectopic pregnancy and rupture in the scar area after wedge excision of the cornu for interstitial pregnancy. The fetus escaped into the abdominal cavity at the beginning of the eighth lunar month. It was delivered alive by laparotomy but failed to survive. In this case there were no signs of rupture such as internal hemorrhage and peritoneal shock. The author suggests that in certain cases of interstitial pregnancy, prophylactic tubal sterilization should be performed. J. P. GREENHILL.

Howard, G. Turner, Jr.: Simultaneous Ruptured Tubal Pregnancy and Intrauterine Pregnancy With Subsequent Delivery of a Normal Infant, South. M. J. 38: 788, 1945.

A third case of simultaneous intrauterine and extrauterine pregnancy is added by Howard to two others found previously reported. Five weeks prior to hospitalization, the patient had a normal menstrual cycle, followed in one week by intermittent cramp-like pains with brownish vaginal discharge. Pain finally localized in the left lower quadrant, and the patient was hospitalized. On admission, examination revealed a uterus of grapefruit size, smooth and soft, with thickening in the left vaginal vault. Temperature was 99.4° F., white blood cell count, 12,100, moderate anemia. Sharp pain in the left lower quadrant, with tenderness and spasm, developed eighteen hours after admission. Laparotomy, done on this indication, revealed a ruptured ectopic in the left tube, and a uterus the size of a two and one-half months' pregnancy. A positive Friedmann test was reported eleven days postoperative, and the patient delivered a normal infant seven months later. JEROME SHAPIRO.

Gynecology

Hundley, J. Mason, and Diehl, William K.: The Influence of Gynecologic Disorders on the Urinary System, J. A. M. A. **127:** 572, 1945.

The various normal physiologic changes occurring in the urinary tract with pregnancy are reviewed. The two chief changes on the ureteral tract are pressure changes and hormonal activity on ureteral atony. The effects of tumors, both benign and malignant, are mentioned. The urinary complications resulting from parturition are chiefly cystocele and decensus. Inability to empty the bladder results in stasis with chronic infection and cystitis. Stress incontinence is another complication resulting either from obstetric trauma or in the postmenopausal patient. Operative repair of these conditions is described. Although vesicovaginal fistulas are rarer these days with improved obstetrical care, an occasional case arises which necessitates repair. The authors describe their procedure for the repair of a large vesicovaginal fistula.

One of the commonest causes of ureteral involvement is due to chronic adnexal disease. Hydroureter and hydronephrosis are not uncommon complications of chronic salpingitis. The authors do not feel that endocervicitis plays a role in the production of cystitis and trigonitis. Endometriosis of the bladder is mentioned as an uncommon complication. The treatment of choice is mentioned in many of these urinary complications.

WILLIAM BERMAN.

Müller, J. H.: The Question of Tubal Peristalsis, Monatschr. f. Geburtsh. u. Gynäk. **117:** 300, 1944.

The author presents hysterosalpingograms to prove that tubal peristalsis exists. His x-ray pictures revealed both tubal peristalsis in the direction of the uterus and peristaltic action from the uterine end toward the fimbria. In the author's two cases of sactosalpinx, the iodine masses moved from place to place, showing that both peristalsis and antiperistalsis took place, producing an alternating peristalsis. J. P. GREENHILL.

Kese, G.: Leech Treatment in Obstetrics and Gynecology, Monatschr. f. Geburtsh. y Gynäk. **117**: 306, 1944.

In order to study the effect of leeches, the author examined the blood of healthy obstetric patients who had been operated on and women with thrombosis as regards the bleeding time, coagulation time, and prothrombin values. A definite prolongation in coagulation and bleeding time was found only in the local oozing blood, but there was no alteration in the prothrombin values. The good results obtained following treatment with leeches is explained by the local withdrawal of blood thereby eliminating pain and the sense of tension. There is also a decrease in the amount of edema and lymph congestion due to improvement in the lymph and collateral circulation. Leech therapy decreases the time of healing. Although it is not understood how the hirudin in the living leech acts, ten years' experience leads the author to recommend strongly the prophylactic and therapeutic use of leeches after every obstetric and gynecologic operation. J. P. GREENHILL.

Scheidegger, S.: The Question of So-called Granulosa- and Theca-Cell Tumors of the Ovary, Monatschr. f. Geburtsh. u. Gynäk. **114**: 175, 1942.

From an experience with four cases in women 6, 52, 75, and 82 years of age, the author came to the conclusion that there are transition forms between the classical granulosa-cell tumors and theca-cell tumors. Pure granulosa-cell tumors are extremely rare. In most cases of granulosal neoplasms, typical theca-cell formations may be found. Sometimes the granulosa- and sometimes the theca-cell formations predominate. It is impossible to make a sharp differentiation between the two types of tumors. J. P. GREENHILL.

Labor, Management, Complications

Ascanio, Escobar R.: Breech Presentation in the "Concepcion Palacios Maternity," Rev. de obst y ginec. **5**: 5, 1945.

The incidence of breech presentation at the "Concepcion Palacios Maternity" was 3.4 per cent. Premature babies constituted more than one-third of the babies, and more than two-thirds of the patients were multiparas. The duration of labor was within normal limits. The total fetal mortality was 30.9 per cent and the corrected rate was 7.1 per cent. The most frequent complications during delivery were prolapse of the cord and lacerations of the genital tract.

The author recommends routine version during pregnancy by means of laxatives and enemas. If these fail, manual external version should be tried. An experienced physician should aid the breech extraction in order to reduce the fetal mortality. Forced traction on the head should be avoided in order to lessen intracranial lesions. Episiotomy should be employed more frequently in multiparas as well as in primiparas, especially in the presence of premature babies. The increased use of forceps on the aftercoming head will avoid the dangers of the Mauricean maneuver. As parts of the instrumentarium, vaginal retractors and an electric aspirator should be included. J. P. GREENHILL.

Biro, S.: Labor in Overweight Women, Monatschr. f. Geburtsh. u. Gynäk. **117**: 185, 1944.

The author studied a series of 160 overweight pregnant women observed over a period of six years. He found that these women had a greater incidence of toxemia and malpresentations of the fetus. The children were larger than usual, their average weight amounting to 3,698 grams. Almost one-fourth of the babies weighed more than 4,000 grams. Labor was not prolonged in these cases but uterine atony, puerperal infection, and operative interference were more frequent. The death rate was 2.5 per cent. These facts indicate that overweight pregnant women require special attention. J. P. GREENHILL.

Pali, K.: Conduct of Labor in the Presence of Thrombosis, Monatschr. f. Geburtsh. u. Gynäk. **119**: 34, 1945.

If in cases of venous thrombosis there exists a contracted pelvis, placenta previa, transverse presentation, advanced age in a primipara, breech presentation with premature rupture of the bag of waters, large baby, eclamptic convulsions, tumors preventing vaginal delivery, edema of the vulva, etc., cesarean section is necessary. In general, the conduct of labor in the presence of a thrombosis depends on whether the patient is a primipara or a multipara. Likewise, the site of the thrombosis and the phase of development of the thrombosis are important. J. P. GREENHILL.

Dominguez Sisco, R., and Aguero, O.: Manual Extraction of the Placenta and Hydraulic Injection, Rev. de obst. y ginec. **5**: 17, 1945.

The authors analyzed their cases of manual removal of the placenta and compared the results with a series of cases in which they used injection of saline solution into the umbilical cord for release of the placenta. Among 282 cases of manual removal of the placenta puerperal infection occurred in 43 per cent, and the death rate was 1.77 per cent. Among the 60 cases where the Mojon-Gabastou injection technique was used, puerperal infection occurred in 2.27 per cent and there were no maternal deaths. Hence the authors favor the injection method, and they recommend a modification of it. J. P. GREENHILL.

Miscellaneous

Peters, Hannah, and Foster, Wilson: Gynecology in Industry. Causes, Treatment, and Educational Program, Indust. Med. **14**: 755, 1945.

The authors summarize two years' experience in the Gynecology Clinic of the Permanent Foundation Hospitals which had served a group of women comprising as many as 23,000 at one time in the shipyards in the Richmond area.

Menorrhagia and metrorrhagia did not appear to show any correlation with the type of work undertaken by the women, save at the outset when women began heavy labor. There was no evidence that hard work, standing, or walking for eight hours caused menstrual disorders. The welding arc exhibits no influence on the catamenia. Scaling and clipping produced no untoward disorder in the menses. The authors explain the increase of menorrhagia concurrent with the onset of heavy labor to dietary changes. Before these women started to work they were eating at best a diet low in vitamin B complex. When manual labor was initiated their caloric requirement and intake became greater. In compensation, they utilized more and more carbohydrates which require more vitamin B complex, which they did not get. The deficiency in Vitamin B complex became progressively greater. Therapy with the B complex controlled the majority of these cases exhibiting menorrhagia and hypermenorrhea with the onset of heavy labor. The writers have not completed their review of those cases with pelvic inflammatory disease. They do state that some cases given an older history of inflammatory disease did present themselves with bleeding, pain, and symptoms of acute exacerbation after a period of heavy work.

The authors state they tried to find a cause for abortion in working women but—"in not a single case could the type of work be held responsible for the early termination of pregnancy." The writers gave no figures to indicate the incidence, type, course, or treatment of women aborting while employed in industry. They agree that the policy of discharging a woman as soon as it becomes known she is pregnant is certainly a hazardous policy.

The medical education program was concerned with a twofold objective, cancer detection, and venereal disease education. All women were subjected to the older Schiller's Iodine Test. Cancer of the ovaries, uterus, and the cervix amounted to 0.9 per cent of all the new cases in these hospitals. Thirteen per cent of all the new gynecologic cases were found to be infected with gonorrhea.

It is unfortunate the authors neglected to mention the number of patients seen presenting the various gynecologic diagnoses. By the omission of such numbers and their statistical evaluation, much of the significance of this valuable data from these large clinics is lost for clinical specialty consideration. CLAIR E. FOLSOME.

Tompkins, Pendleton: Basal Body Temperature Grasps as an Index to Ovulation, J. Obst. & Gynaec. Brit. Emp. **52:** 241, 1945.

Evidences are accumulating that the basal body temperature in women is directly related to the phases of the menstrual cycle. The temperature is relatively low prior to ovulation, shifts to a higher level about the time of ovulation, and maintains this higher level until the next menses, when it falls and the cycle is then repeated. This study is important in the evaluation of infertility. Reasonable care must be employed to insure basal conditions when the temperature is taken. All temperatures were taken by rectum and were taken in the morning before arising and before taking food or liquid. A number of charts illustrating the above are included in the manuscript. WILLIAM BERMAN.

Schneider, Wilmot F.: Arachnodactyly—Unusual Complication Following Skull Injury, J. Pediat. **27:** 583, 1945.

This report traces the progressive development of various anomalies observed in Marfan's syndrome. In the reported case failing vision was definitely observed between the fourth and fifth year. Progressive loss of vision finally shut the girl from the world almost completely. She was not adequately safe-guarded. At the age of 12 years she fell through an open cellar door and had her visual abnormalities complicated by the head injury, which set in motion the retinal detachment and bilateral glaucoma. The author recommends early orthopedic treatment to prevent crippling deformities, and early recognition of ocular deficiencies and treatment. JAMES P. MARR.

The Newborn

Wespi, H. J.: Reduction of Deafness and Dumbness in Switzerland as Result of Goiter Prophylaxis With Iodized Salt, Schweiz. med. Wchnschr. **75:** 625, 1945.

During the years 1915 to 1922 the incidence of deafness and dumbness varied between 11.7 and 16.6 per 10,000 live born children. After 1922 the incidence decreased so that as early as 1925 the figure was 4.3 per 10,000 live births. This reduction in deafness and dumbness occurred simultaneously with the introduction of iodized salt into Switzerland. Even in the cantons which had as high an incidence as 20 per 10,000 cases of deafness and dumbness experienced a rapid drop in the incidence after the introduction of iodized salt. Hence, there is a definite connection between goiter prophylaxis and reduction in the frequency of deafness and dumbness. J. P. GREENHILL.

Wespi, H. J.: The Prevention of Goiter in the Newborn, Monatschr. f. Geburtsh. u. Gynäk. **118:** 113, 1944.

The author administered an iodine solution in addition to iodized salt to pregnant women, and thereby reduced the incidence of goiter in the newborn babies. The frequency of goiter in the newborn was inversely proportionate to the amount of iodine administered. Hence goiter is primarily an iodine deficiency disease and can be prevented by giving iodine. J. P. GREENHILL.

Graubarth, Julian, Bloom, Charles J., Coleman, Francis C., and Solomon, Harry N.: Dye Poisoning in the Nursery, J. A. M. A. **128:** 1155, 1945.

The authors report 17 cases of aniline poisoning that occurred in a nursery where the diapers were stamped with ink containing aniline dye. Thirteen babies recovered, and four died from unrelated causes. This condition is to be differentiated from other causes of cyanosis in a newborn. These babies were treated with methylene blue, oxygen with 5 per cent carbon dioxide and whole blood transfusions. The methylene blue and oxygen had no apparent effect on the time and type of recovery of any of the infants. Adequate treatment lies first in the prevention, then in removing the source, transfusion of whole blood or red cells suspended in saline solution, fresh air, and isolation.

WILLIAM BERMAN.

Leonard, Martha F.: Hemolytic Disease of the Newborn (Erythroblastosis Fetalis) Clinical Analysis of Fifty-Five Cases, With Special Reference to Pathogenesis, Prognosis, and Therapy, J. Pediat. 27: 249, 1945.

Fifty-five cases of hemolytic disease of the newborn treated at the New York Hospital are reported.

In thirty-three cases, Rh factors were determined; of these, 84 per cent showed the typical pattern. In 16 per cent mother, father, and infant were all Rh positive. These figures are consistent with observation of others. The pathogenesis of hemolytic disease of the newborn has not yet been completely elucidated. The factor of isoimmunization has been generally accepted, and needs no repetition. Recent authors have stressed hemolysis as the primary factor, with other manifestations as secondary to the hemolysis and the accompanying anemia.

Impaired ability of the liver to form prothrombin has been amply demonstrated by autopsy findings in 9 patients showing liver damage with necrosis, fatty degeneration, vacuolation, or unusual pigment accumulation. A number of explanations have been advanced for the cause of this poor liver function, as: intrauterine asphyxia due to placental abnormality or to drugs given the mother during labor, or immaturity, constitutional inferiority, or anaphylaxis.

Recovery from the disease required from one week to three months. The tendency for anemia to recur often lasted as long as from four to six weeks after birth, necessitating repeated transfusions. Nineteen of the 55 infants died, a mortality of 35 per cent.

The prominence of hemorrhagic tendencies in patients with hemolytic disease of the newborn was emphasized, and the value of vitamin K given to the mother or infants are demonstrated.

The necessity for immediate transfusion in the presence of normal blood levels are questioned, and reasons were given for delaying transfusion until anemia impends. Plasma infusions were preferred in this type of patient.

Administration of vitamin K to donors of Rh-negative blood was suggested as a means of raising the prothrombin levels of affected patients. JAMES P. MARR.

Miller, Herbert C.: The Effect of the Prediabetic State on the Survival of the Fetus and the Birth Weight of the Newborn Infant, New England J. Med. 233: 376, 1945.

The nature of the factor or factors responsible for the increased newborn mortality and increased birth weights of infants born to prediabetic mothers remains unknown. Presumably, the primary factors are the same as those that are responsible for the high mortality and increased birth weight of infants born to mothers who already have developed diabetes.

Because obesity is one of the frequent characteristics of women developing diabetes in later life, and because it seemed possible that the maternal obesity was a factor in the increased birth weights, a study of such material was made, and the conclusion drawn that there was no significant difference found between the average birth weight of the infants in the obese group and those in the nondiabetic group. JAMES P. MARR.

Pregnancy, Complications

Brentnall, C. Philip: A Case of Arrhenoblastoma Complicating Pregnancy, J. Obst. & Gynaec. Brit. Emp. 52: 235, 1945.

The author reports this rare case occurring in a pregnancy in which the mother showed all the external evidence of masculinization. She was delivered by cesarean section after spontaneous rupture of her membranes during the thirty-seventh week of pregnancy, and was delivered of a 6½-pound child resembling a female pseudohermaphrodite.

An attempt is made by the author to explain the embryologic development of the child with reference to the appearance of the external genitalia, and he concludes that it is most

likely that the androgen from the ovarian tumor did not reach the fetus in effective quantity until the third month of fetal life, and by this time the female hormone of the fetal gonad had already produced some reactions in the accessory sex organs, probably in the upper part of the urogenital sinus. WILLIAM BERMAN.

Beacham, Woodward Davis, and Varino, George Andrew: Ruptured Uteri: An Analytical Report of Sixty-Four Cases Managed at the Charity Hospital of Louisiana at New Orleans, With a Review of the Literature, New Orleans M. & S. J. 98: 91, 1945.

The authors' analytical report on 64 cases of ruptured uteri includes a short history and a survey of the incidence, mechanism, etiology, pathology, diagnosis, and treatment of this obstetric emergency. The significant factor is a diagnosis prior to rupture, this being determined by no progress in labor, despite strong and frequent pains and impending or actual rupture by tenderness over the lower segment, and sudden, sharp, tearing pain in the abdomen. Statistics are quoted, giving the fetal and maternal mortality from various sources, the fetal mortality being in the authors' series 73 per cent and 60.9 per cent, respectively. Interesting factors mentioned are frequency of rupture in the classical as compared to low flap sections, the importance of proper scar healing in previous sections, and the prophylactic measures stressed: namely, avoidance of oxytocics, and early cesarean section.

The thought occurs that some of these cases may have been put into further shock after transfusion, and the value of determination of the Rh factor in all of these cases prior to this transfusion is suggested.

The bibliography following the article is an excellent source for further reading on this subject. JEROME SHAPIRO.

James, David W.: Pernicious Vomiting of Pregnancy Due to Sensitivity to Semen, West. J. Surg. Obstetrics and Gynecology 53: 380, 1945.

This case, apparently the first reported of pernicious vomiting of pregnancy due to contact sensitivity to the husband's semen, revealed several interesting facts. During each of three attacks, the vomiting occurred exactly three days after intercourse with semen deposition; each attack subsided after eight days. There was no response to the usual therapeutic measures, such as sedation, thiamine intravenously, isolation, restricted diet, and bed rest. Coitus, using a condom, and coitus interruptus produced no allergic phenomena. Passive transfer, by injecting the patient's serum into three nonallergic individuals, demonstrated the patient's sensitivity to an extract of her husband's semen. JEROME SHAPIRO.

Macafee, C. H. G.: Placenta Previa—A Study of 174 Cases, J. Obst. & Gynaec. Brit. Emp. 52: 313, 1945.

In a series of 174 cases of placenta previa treated at the Royal Maternity Hospital in 1937 to 1944, and including 23 private cases, there was only one maternal death (maternal mortality, 0.57 per cent); the fetal mortality (stillbirths and neonatal deaths) was 23.5 per cent (41 deaths). In the earlier cases in this series, vaginal examination was made in many cases shortly after admission to the hospital; 17 of the 91 fetal deaths occurred in the first two years. In the later years vaginal examination was not made until all preparations were made for carrying out the subsequent treatment indicated. A vaginal examination was ultimately made in every case in this series to determine the type of placenta previa and the best method of treatment. But the author's experience has convinced him that placenta previa is not an emergency that must necessarily be dealt with at the first hemorrhage; severe initial hemorrhage rarely occurs unless vaginal examination is made; and such examination should, therefore, be postponed to as near full term as possible, when the patient is prepared for delivery by cesarean section, if necessary. Several patients in this series have remained in the hospital for weeks and have had repeated small hemorrhages before vaginal examination was made. This plan avoids one of the chief dangers to the fetus—prematurity.

If a hemorrhage occurs when the patient is approaching term, e.g., at thirty-eight weeks, the treatment indicated can be carried out immediately. This plan has resulted in the reduction of infant mortality. In the first 47 cases in which this plan was not in force, the average weight of the infants at birth was 5 pounds, 2 ounces, and the infant mortality was 47 per cent; while in the last 47 cases, the average weight of the infants at birth was 6 pounds, 12 ounces, and the infant mortality 6 per cent.

It has long been recognized that a placenta previa is usually larger and thinner than normal; it has also been recognized that in placenta previa there is often an eccentric insertion of the umbilical cord. The importance of the latter fact, the author believes, has not generally been recognized in its relation to fetal mortality. If the cord is inserted at the lower edge of the placenta where the separation occurs, or has a velamentous insertion in this area, the infant often dies after the initial hemorrhage, although this is not severe; while if the cord is inserted centrally or at the edge of the placenta farthest away from the internal os, the infant survives even though the hemorrhage is more severe.

In case of type I placenta previa, artificial rupture of the membranes is usually sufficient to control the hemorrhage. This was the method employed in 38 of 50 cases of this type in this series; only two cesarean sections were done in this group, both in elderly patients. Version has been used chiefly for controlling severe hemorrhage when the fetus is immature or has died; it can also be used for delivering a multipara with a history of very rapid deliveries, when the infant is full term and living. Cases of type II on the anterior wall can usually be treated by artificial rupture of the membranes; but if situated posteriorly cesarean section is often indicated. Cesarean section is also the safest method in cases of type IV and in most cases of type III. Cesarean section was done in 68 cases in this series, with a fetal mortality of 2.9 per cent (2 deaths). The majority of cesarean sections were of the lower segment type, especially in the later years. The danger of hemorrhage in this type of operation is diminished by the injection of 0.25 mg. of ergometrine and 1 c.c. of pitocin into the uterine wall, and the removal of the placenta after the uterine incision has been partially sutured.

HARVEY B. MATTHEWS.

Pregnancy, Physiology

Braga, E.: Clinical Sign Diagnostic of Early Pregnancy, Obst. y ginec. latino-am. 3: 321, 1945.

The author presents a new sign of early pregnancy. In a series of 1,110 primiparas between 16 and 26 years of age he found it in 98.5 per cent up to the second week of pregnancy(?). It then disappeared slowly after this time. The sign consists of the ability to produce with the two examining fingers a fold of vaginal mucosa on either side of the cervix. The slow and progressive disappearance of the fold demonstrates the gestational imbibition of the cervix. The sign is called the "Supplementary Hegar" sign in honor of Hegar, and also to indicate that it is a substitute for the Hegar No. 2 sign which is a dangerous procedure.

J. P. GREENHILL.

Kendrick, Pearl, Thompson, Mary, and Eldering, Grace: Immunity Response of Mothers and Babies to Injections of Pertussis Vaccine During Pregnancy, Am. J. Dis. Child. 70: 25, 1945.

The authors report the results of their study on the opsonocytophagic reaction of H. pertussis of 99 pregnant women, of whom 57 were immunized with pertussis vaccine, and 42 were nonimmunized.

From a practical standpoint, the results of the study suggest the value under certain conditions of giving a series of injections of pertussis vaccine to pregnant women to raise the level of immunity in their babies.

JAMES P. MARR.

Vartan, C. Keith: The Behaviour of the Foetus in Utero With Special Reference to the Incidence of Breech Presentation at Term, J. Obst. & Gynaec. Brit. Emp. 52: 417, 1945.

In a study of 3,875 pregnant women in an antenatal clinic, the author found that the fetus was in breech presentation at some time during the pregnancy in 1,000 cases. The first

examination for this particular study was made at about the thirtieth week of pregnancy. If it had been possible to make repeated skiagrams of all cases, an even higher incidence of breech presentation might have been found. In 680 cases spontaneous cephalic version took place, and in 599 of these cases this was the only movement of the fetus known to have taken place. Spontaneous version was observed to take place at a specific time in pregnancy; in this series by the thirty-fourth week, and probably in many cases by the thirty-second week. The incidence of reversion to the breech presentation was low (25 cases). External version was performed in 330 cases; in 223 cases this procedure was successful and no reversion occurred; in an additional 35 cases this had to be repeated, but was ultimately successful; the total number of cases in which external version was ultimately successful was 258, and the reversion rate after this procedure was approximately 22 per cent. The reversion rate was reduced if external version was done after the thirty-third week of pregnancy. External version failed to turn the breech to a vertex in 77 cases; version subsequently occurred spontaneously in 28 of these cases; and in 13 cases the failure was subsequently overcome by the obstetrician; in 36 cases breech delivery was done. In 20 of the 36 cases of breech delivery the attitude was extension, and in one other case, semiextension. Very little liquor was estimated to be present in three cases, and there was one case of multiple pregnancy. The total number of breech deliveries was 85 in this series of 1,000 cases in which breech presentation was present at some time during pregnancy.

Breech presentation should be regarded as normal at a certain stage of pregnancy; spontaneous version usually occurs, although the reason for this requires further investigation. The findings in the cases of failed version indicate that an extended attitude and insufficient liquor are the chief causes of breech presentation at term, i.e., failure of spontaneous version, multiple pregnancy, and prematurity are also factors. External version is indicated as a therapeutic measure for breech presentation persisting after the thirty-second week of pregnancy.

HARVEY B. MATTHEWS.

Puerperium

Rodriguez, Ximeno, M.: Spontaneous Expulsion of an Intraparietal Uterine Tumor During the Puerperium, Arch. urug. de med. cir. y especialid. **23**: 349, 1945.

The author reports a case in which on the second postpartum day, a myoma the size of an eight months' baby's head was expelled spontaneously. During pregnancy a fibromyoma was suspected, because the author felt a mass in one side of the uterus which made the abdomen appear too large for the particular period of pregnancy. The uterine tumor was expelled by the action of the uterine contractions and the process of involution. In this case the puerperium was afebrile, the lochia were normal, and the uterus involuted well.

J. P. GREENHILL.

Palik, F., and Rechwitz, K.: The Cause of Late Bleeding in the Puerperium, Monatschr. f. Geburtsh. u. Gynäk. **117**: 74, 1944.

In nine cases of delayed puerperal hemorrhage (four after full-term labor and five after abortions) the only cause found for the bleeding was hyaline degenerated decidua. The degeneration of the decidua probably began before delivery or abortion due to the activity of the trophoblast. The liquefaction and expulsion of the decidua was probably interrupted because the fibrinous degenerated decidua failed to set up a round cell demarcation as protection. Treatment consisted of instrumental removal of the decidual remnants. In abortion cases, the early onset of menstruation may bring about spontaneous healing.

J. P. GREENHILL.

Perez, M. L., and Blanchard, O.: Preventive Local Chemotherapy in Operative Obstetrics, Obst. y ginec. latino-am. **3**: 161, 1945.

The authors again emphasize the great value of the prevention of puerperal sepsis following operative deliveries by forceps, version and extraction, manual removal of the placenta, etc. They instill 5 Gm. of sulfanilamide powder into the uterine cavity by means

of a special apparatus which they devised. Previously the authors reported a series of 80 cases in which they used sulfanilamide prophylactically and in which the incidence of morbidity was only 5 per cent. They now add 65 cases. These 145 women had been subjected to various types of obstetric operations, some of them serious; yet morbidity occurred in only 11 per cent. The authors firmly believe that prophylactic local chemotherapy during obstetric operations marks a real advance in obstetric progress.

J. P. GREENHILL.

Bird, J. G.: Postpartum Traumatic Gynatresia, Bol. Asoc. méd. de Puerto Rico 37: 205, 1945.

The author operated upon a woman who had a complete traumatic atresia of the vagina following a forceps delivery ten years previously. After making a new vagina, a vaseline gauze tampon was used because the author could not obtain a rubber plug. Two months after operation, the vagina permitted the insertion of three fingers and also a moderate-sized speculum without any pain. Coitus could be performed without discomfort. Three months later the patient was pregnant. In a second case of partial stenosis following a forceps delivery constriction ringers were incised laterally and sutured vertically with excellent results. There has been no dyspareunia since the operation.

J. P. GREENHILL.

Item

American Board of Obstetrics and Gynecology, Inc.

Examinations

The next written examination (Part I) for all candidates will be held in various cities of the United States and Canada on Friday, Feb. 7, 1947, at 2:00 P.M. Candidates who successfully complete the Part I examination proceed automatically to the Part II examination held later in the year. All applications must be in the office of the Secretary by Nov. 1, 1946. Candidates in military service are requested to keep the Secretary's Office closely informed of changes in address.

A number of changes in Board regulations and requirements were put into effect at the last annual meeting of the Board held in Chicago, Illinois, from May 5 to May 11, 1946. Among these is the requirement that case records must now be forwarded to the Secretary's Office from thirty to sixty days after the candidate has received notice of his eligibility for admission to the examinations for certification. At this meeting the Board also ruled that it will not accept the nine months' residency as an academic year toward years of training requirements following the termination of the official period of intern and residency acceleration, April 1, 1946.

Applications are now being received for the 1947 examinations. For further information and application blanks address Paul Titus, M.D., Secretary, 1015 Highland Building, Pittsburgh 6, Pennsylvania.

PAUL TITUS, M.D.

ROSTER OF AMERICAN OBSTETRICAL AND GYNECOLOGICAL SOCIETIES*

(Appears in January, April, July, October)

American Gynecological Society. (1876) *President,* Norris Vaux, Philadelphia, Pa. *Secretary,* Norman Miller, Ann Arbor, Mich. Annual meeting to be announced.

American Association of Obstetricians, Gynecologists and Abdominal Surgeons. (1888) *President,* A. D. Campbell, Montreal, Quebec. *Secretary,* James R. Bloss, 418-11th Street, Huntington, W. Va. Annual meeting Hot Springs, Va., Sept. 4-6, 1947.

Central Association of Obstetricians and Gynecologists. (1929) *President,* Earl C. Sage, Omaha, Neb. *Secretary-Treasurer,* John I. Brewer, Chicago, Ill. Annual meeting Louisville, Ky., Sept., 1947.

South Atlantic Association of Obstetricians and Gynecologists. (1938) *President,* Robert A. Ross, Durham, S. C. *Secretary,* T. J. Williams, University, Va. Annual meeting at the General Oglethorpe Hotel, Savannah, Ga., Feb. 7-8, 1947.

A. M. A. Section on Obstetrics and Gynecology. *Chairman,* Philip F. Williams, Philadelphia, Pa. *Secretary,* William Mengert, 2211 Oak Lawn Ave., Dallas, Tex. Annual meeting Atlantic City, June, 1947.

New York Obstetrical Society. (1863) *President,* Harvey B. Matthews. *Secretary,* R. G. Douglas, 530 East 70th St., New York City. Second Tuesday, from October to May, Yale Club.

Obstetrical Society of Philadelphia. (1868) *President,* F. Sidney Dunn. *Secretary,* James P. Lewis, 1930 Chestnut St., Philadelphia, Pa. First Thursday, from October to May.

Chicago Gynecological Society. (1878) *President,* Ralph A. Reis. *Secretary,* Herbert E. Schmitz, 25 East Washington St., Chicago 2, Ill. Third Friday, from October to June, Hotel Knickerbocker.

Brooklyn Gynecological Society. (1890) *President,* John J. Madden. *Secretary,* William T. Daily, 142 Joralemon St., Brooklyn, N. Y. First Friday, from October to May, Kings County Medical Society, 1313 Bedford Ave., Brooklyn, N. Y.

Baltimore Obstetrical and Gynecological Society. (1929) *President,* Lawrence Wharton. *Secretary-Treasurer,* John W. Haws, 9 E. Chase St., Baltimore, Md. Meets quarterly at Maryland Chirurgical Faculty Bldg.

Cincinnati Obstetrical Society. (1876) *President,* Carroll J. Fairo. *Secretary,* Joseph G. Crotty, 136 West McMillan St., Cincinnati, Ohio. Third Thursday of each month.

Louisville Obstetrical and Gynecological Society. *President,* Layman A. Gray. *Secretary,* E. P. Solomon, Hegburn Bldg., Louisville, Ky. Fourth Monday, from September to May, Brown Hotel.

Portland Society of Obstetrics and Gynecology. President, Charles Hunt. *Secretary-Treasurer,* Karl H. Martzloff, 808 Medical Dental Bldg., Portland, Ore. Last Wednesday of each month.

Pittsburgh Obstetrical and Gynecological Society. (1934) *President,* Charles J. Barone. *Secretary,* Eugene A. Conti, 519 North Highland Ave., Pittsburgh 6, Pa. First Monday of October, December, February, April, and June.

Obstetrical Society of Boston. (1861) *President,* George Van S. Smith. *Secretary,* Paul A. Younge, 101 Bay State Road, Boston, Mass. Third Tuesday, October to April, Harvard Club.

New England Obstetrical and Gynecological Society. (1929) *President,* Arthur E. G. Edgelow, Springfield, Mass. *Recorder,* Carmi R. Alden, 270 Commonwealth Ave., Boston 16, Mass. Meetings held in May and December.

Pacific Coast Obstetrical and Gynecological Society. (1931) *President,* Goodrich C. Schauffer. *Secretary-Treasurer,* William Benbow Thompson, 6253 Hollywood Blvd., Los Angeles, Calif.

Washington Gynecological Society. (1933) *President,* James R. Costello. *Secretary,* Geo. J. Ellis, 1150 Connecticut Ave., N.W., Washington, D. C., Fourth Saturday, October to May.

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*Changes, omissions, and corrections should be addressed to the Editor of the JOURNAL. The number after the Society's name is the year of founding.

New Orleans Obstetrical and Gynecological Society. (1924) *President,* E. L. Zander. *Secretary,* R. A. Grasser, 2700 Napoleon Ave., New Orleans, La. Meetings held every other month.

St. Louis Gynecological Society. (1924) *President,* Otto Krebs. *Secretary,* John E. Hobbs, 630 S. Kingshighway, St. Louis, Mo. Meetings second Thursday, October, December, February, and April.

San Francisco Gynecological Society. (1929) *President,* Albert M. Vollmer. *Secretary,* Daniel G. Morton, University of California Hospital, San Francisco, Calif. Regular meetings held second Friday in month from October to April, University Club, San Francisco, or Claremont Country Club, Oakland, Calif.

Texas Association of Obstetricians and Gynecologists. (1930) *President,* T. F. Bunkley. *Secretary,* J. McIver, 714 Medical Arts Bldg., Dallas, Tex.

Michigan Society of Obstetricians and Gynecologists. (1924) (Formerly the Detroit Obstetrical and Gynecological Society.) *President,* Clarence E. Toshach. *Secretary,* John P. Ottaway, 1551 Woodward Ave., Detroit, Mich. Meetings first Tuesday of each month from October to May (inclusive).

Central New York Association of Obstetricians and Gynecologists. (1938) *President,* Raymond J. Pieri. *Secretary,* Nathan N. Cohen, 713 E. Genesse St., Syracuse, N. Y. Meets second Tuesday of September, November, January, March, and May.

Alabama Association of Obstetricians and Gynecologists. *President,* Gilbert F. Douglas. *Secretary,* Hunter Brown, 1922 South Tenth Ave., Birmingham, Ala.

San Antonio Obstetric Society. *President,* I. T. Cutter. *Secretary,* S. Foster Moore, Jr., San Antonio, Tex. Meetings held first Tuesday of each month at Gunter Hotel.

Seattle Gynecological Society. (1941) *President,* Gerhard Ahnquist. *Secretary,* Roger E. Stewart, Stimson Bldg., Seattle, Wash. Meetings held on third Wednesday of each month.

Denver Obstetrical and Gynecological Society. (1942) *Secretary,* Emmett A. Mechler, 1612 Tremont St., Denver, Colo.

Wisconsin Society of Obstetrics and Gynecology. (1940) *President,* Roland S. Cron. *Secretary,* Robert E. McDonald, 425 E. Wisconsin Ave., Milwaukee, Wis. Meetings held in May and October.

San Diego Gynecological Society. (1937) *President,* R. C. Hall. *Secretary,* D. Dalton Deeds, 2001 Fourth Ave., San Diego, Calif. Meetings held on the last Wednesday of each month.

North Dakota Society of Obstetrics and Gynecology. (1938) *President,* Ralph E. Leigh, Grand Forks. *Secretary,* G. Wilson Hunter, 807 Broadway, Fargo, N. D.

Virginia Obstetrical and Gynecological Society. (1936) *President,* S. E. Oglesby. *Secretary,* L. L. Shamburger, 628 State Office Bldg., Richmond 19, Va. Next meeting not announced.

Columbus Obstetrical and Gynecological Society. (1944) *President,* Wynne M. Silbernagel. *Secretary,* Zeph J. R. Hollenbeck, 9 Buttles Ave., Columbus, Ohio. Meetings held fourth Wednesday of each month.

Nassau Obstetrical Society. (1944) *President,* George B. Granger. *Secretary,* William S. C. Dolan, 2870 Northern Blvd., Manhasset, N. Y. Meetings, bimonthly from October to May.

Bronx Gynecological and Obstetrical Society. (1924) *President,* Harry Gordon. *Secretary-Treasurer,* J. Irving Kushner, 1840 Grand Concourse, New York, N. Y. Meetings, fourth Monday monthly from October to May.

Washington State Obstetrical Society. (1936) *President,* John H. Fiorino, Everett. *Secretary,* H. H. Skinner, Yakima. Meetings, first Saturday of April and October.

Kansas City Obstetrical and Gynecological Society. (1922) *President,* J. Milton Singleton. *Secretary,* Richard C. Helman. Meetings, third Thursdays, September, November, January, March, and May, University Club.

Los Angeles Obstetrical and Gynecological Society. (1914) *President,* George E. Judd. *Secretary,* Carl E. Krugmeier, 2200 West Third Street, Los Angeles, Calif.

North Carolina Obstetrical and Gynecological Society. (1932) *President,* Wallace B. Bradford. *Secretary,* Richard B. Dunn. Meetings semiannually.

The Society of Obstetricians and Gynecologists of Canada. (1944) *President,* William A. Scott. *Secretary,* James Goodwin, 516 Medical Arts Bldg., Toronto, 5. Meetings held annually, date of next meeting to be announced later.

Akron Obstetrical and Gynecological Society. (1946) *President,* H. H. Gibson. *Secretary,* Alven M. Weil, 1030 First Central Tower Bldg., Akron 8, Ohio.